

Spring 2017 Salmon Report



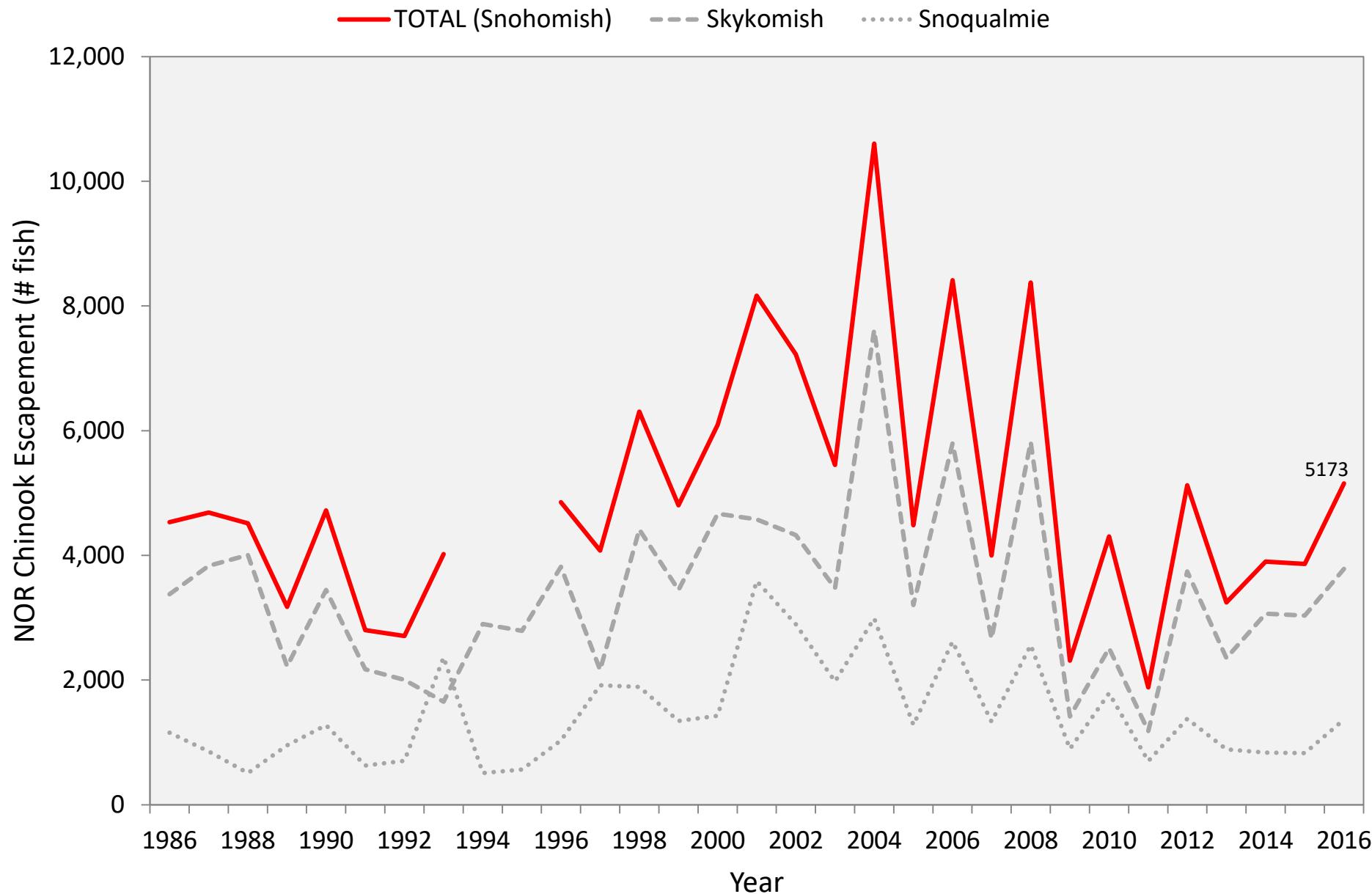
May 11, 2017
Colin Wahl
Tulalip Tribes



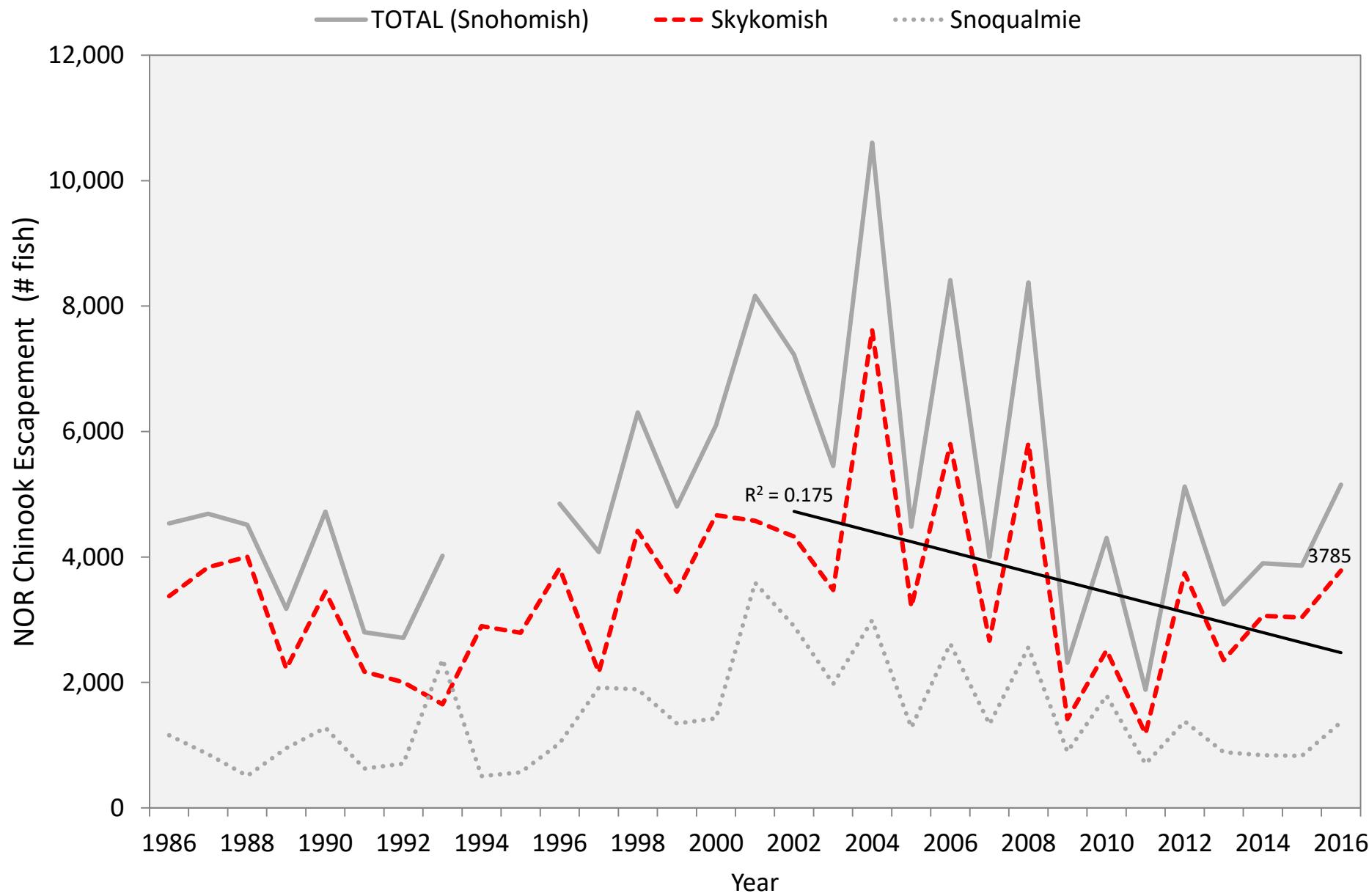


- Escapement trends (Adult returns)
- Trap numbers (Juvenile migration)
- Ocean conditions/factors affecting trends
- 2017 forecast
- FRAM and 2017 harvest management plan

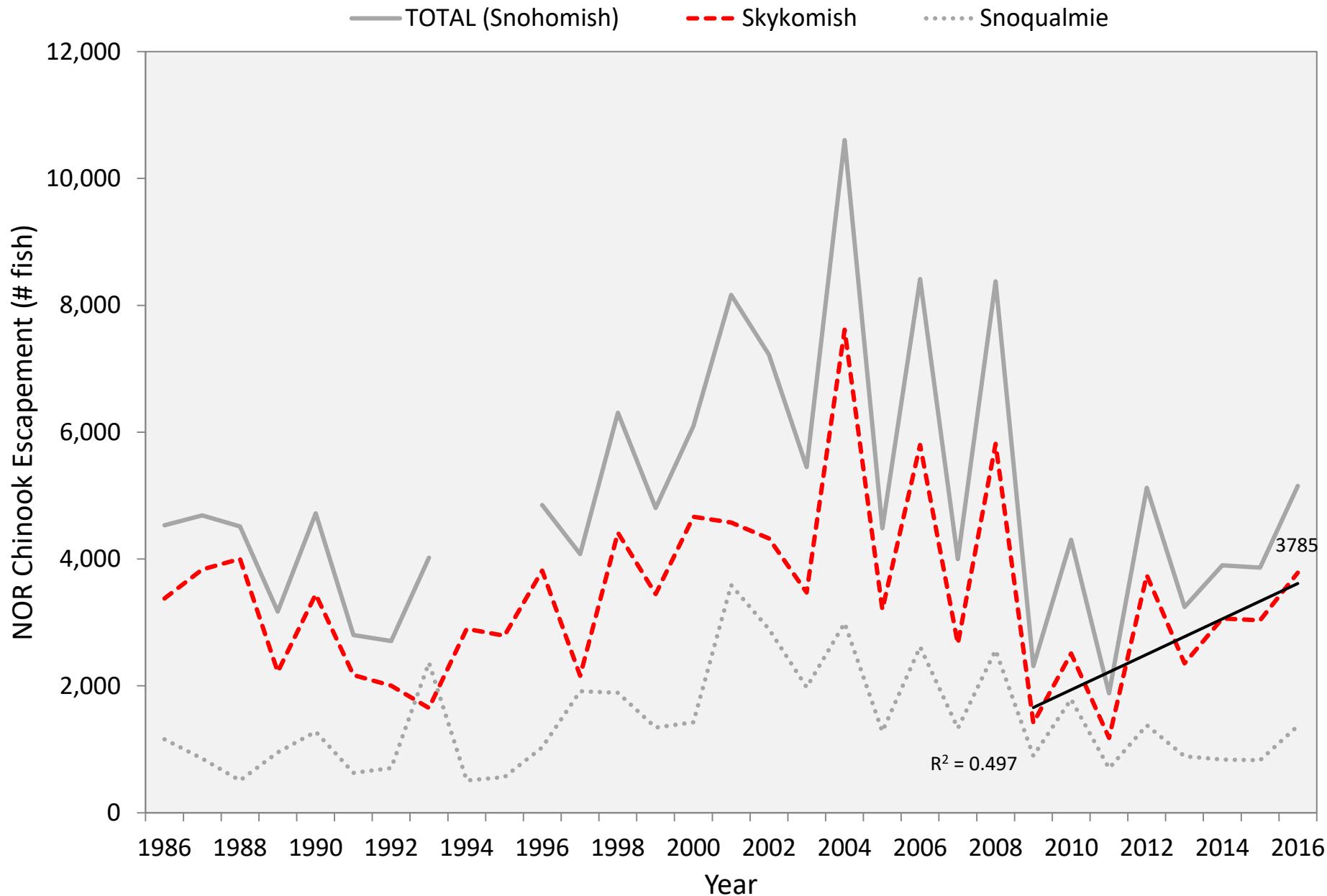
Snohomish Chinook Escapement



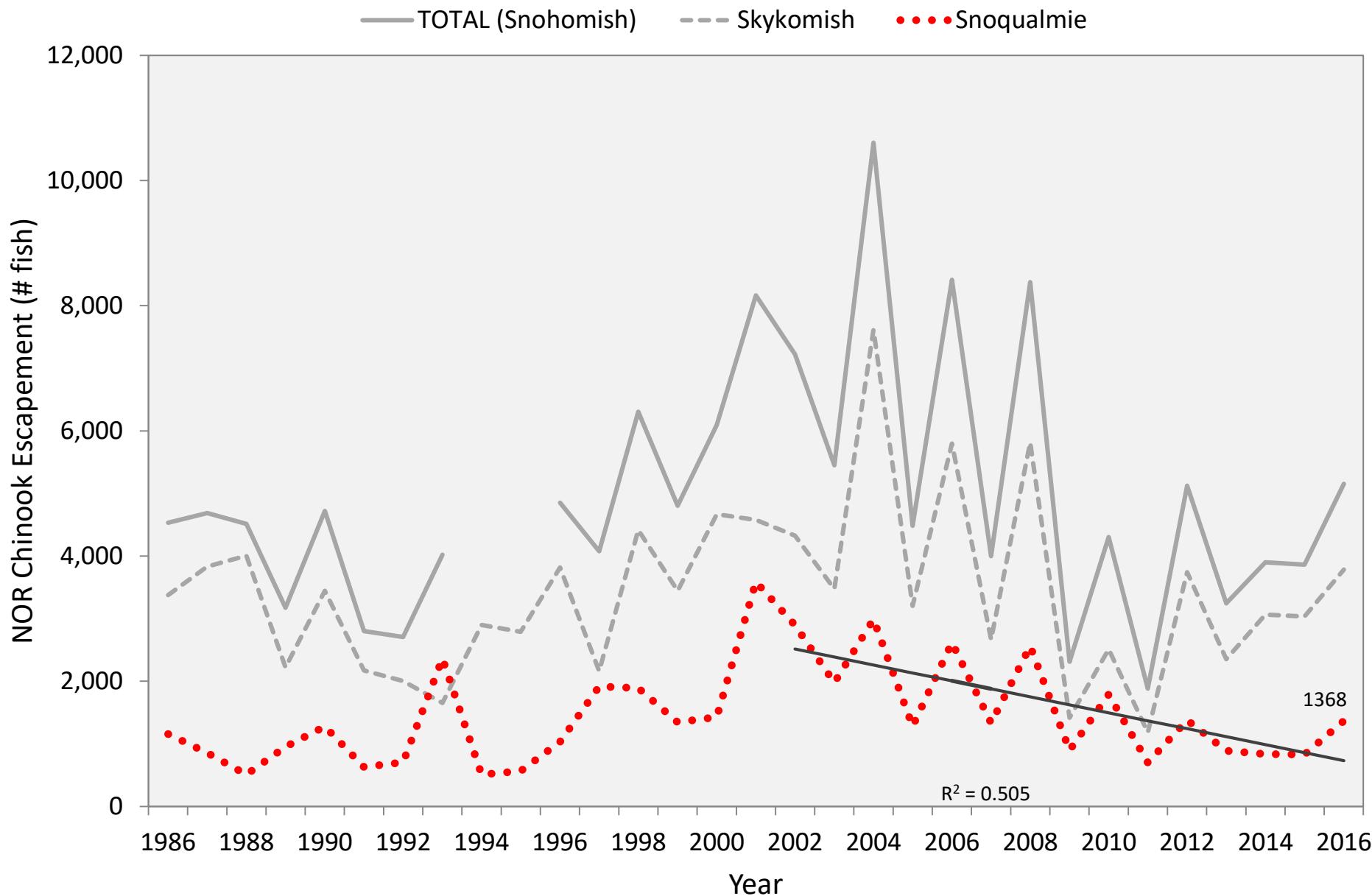
Skykomish Chinook Escapement



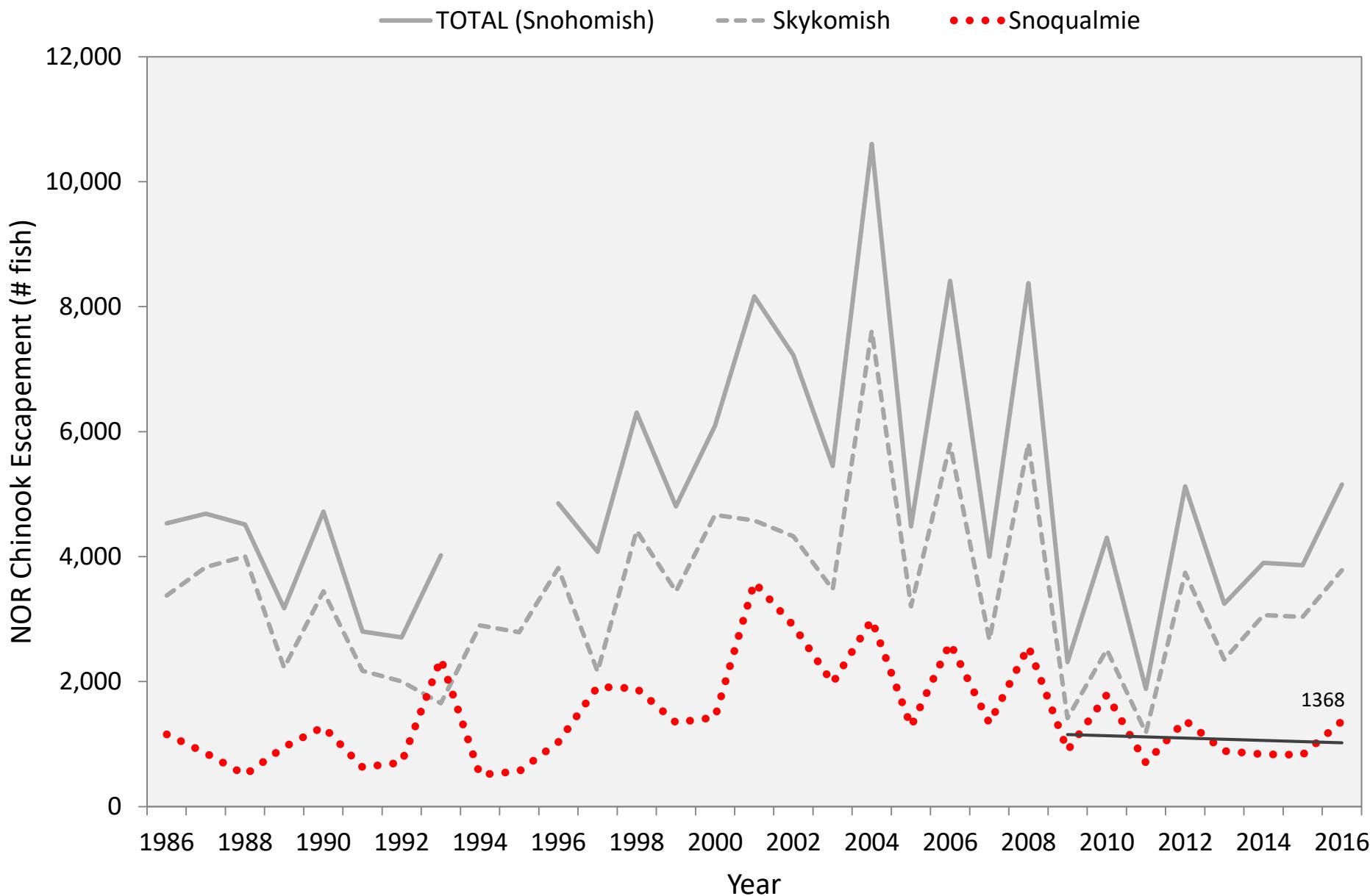
Skykomish Chinook Escapement



Snoqualmie Chinook Escapement

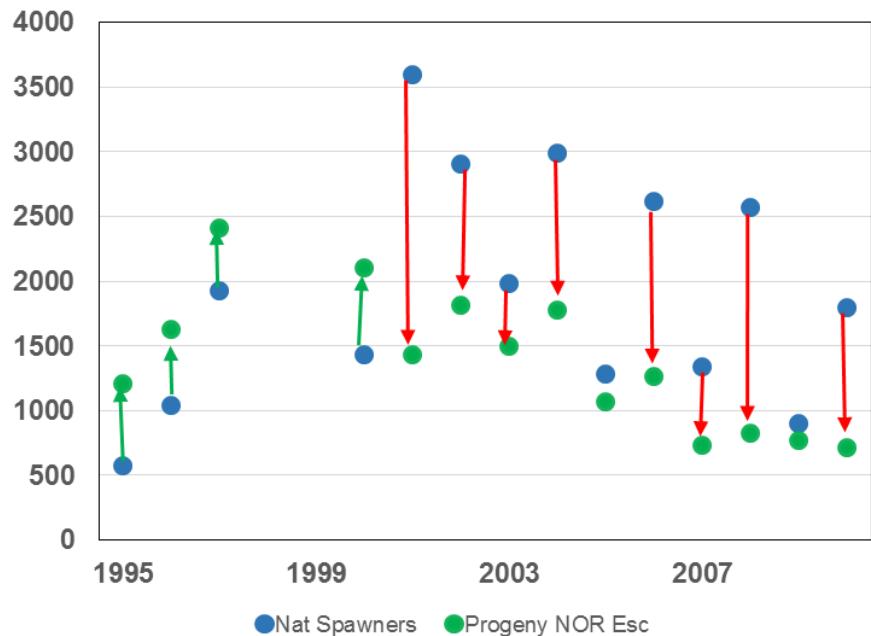


Snoqualmie Chinook Escapement

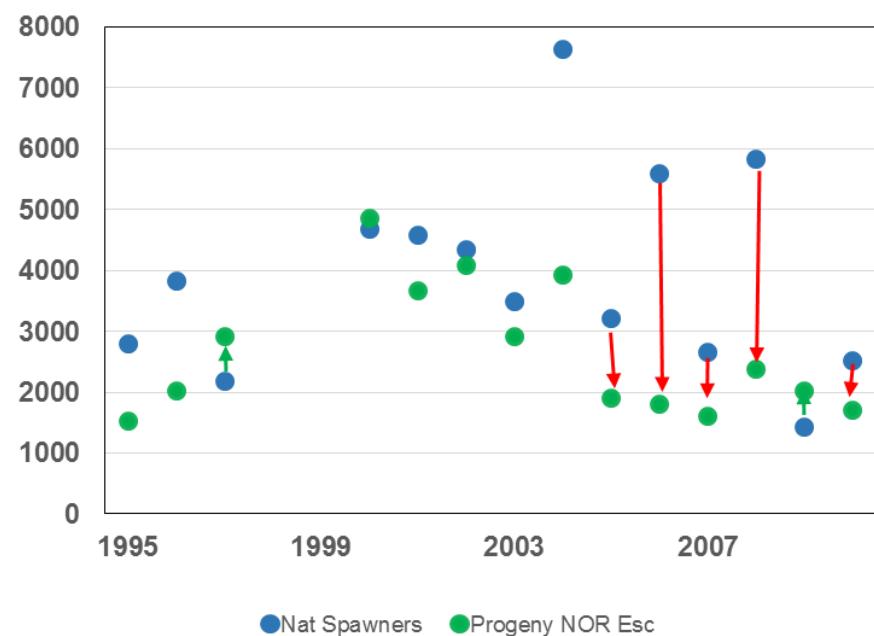


Declining Chinook Productivity

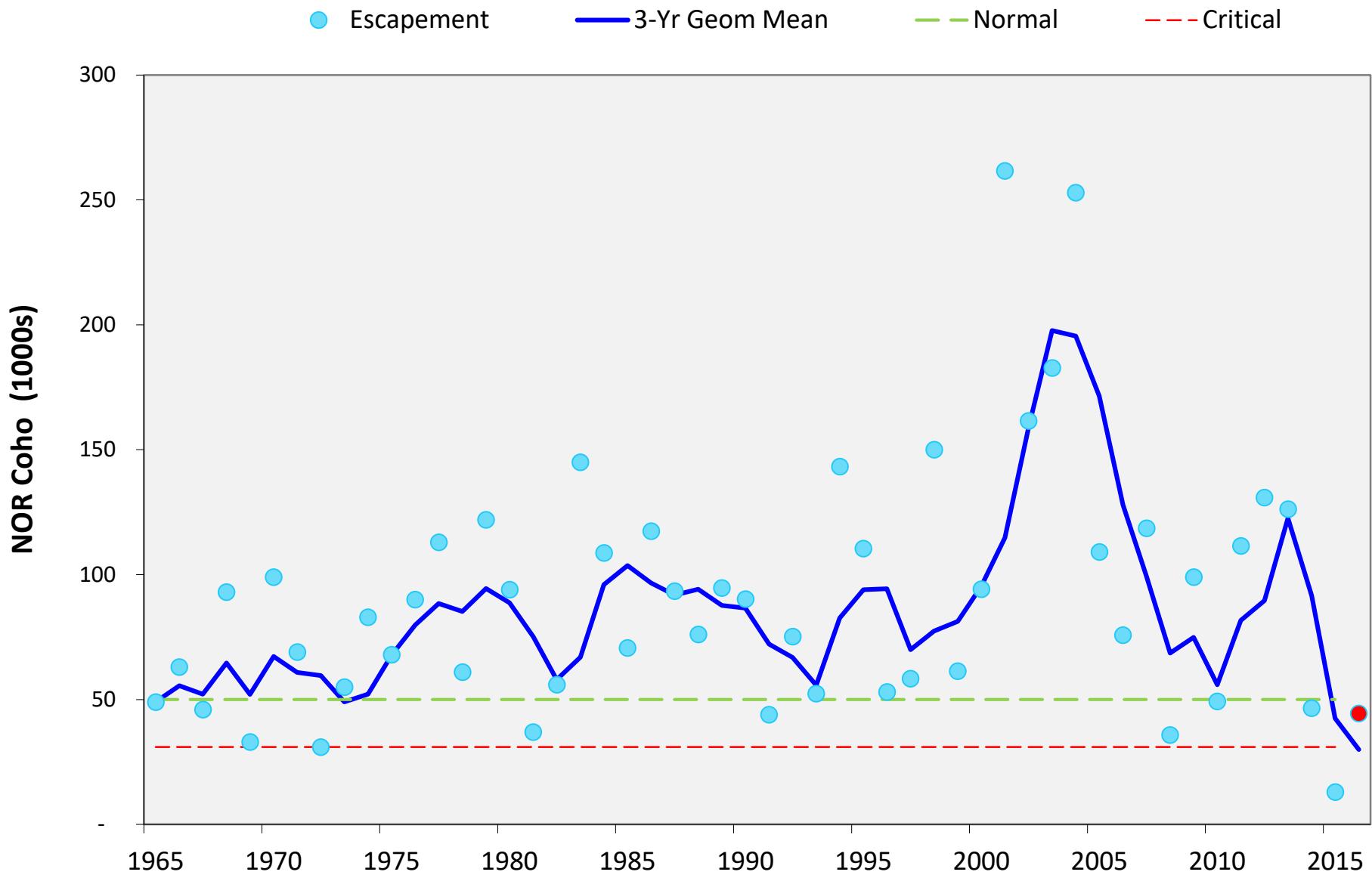
Snoqualmie Chinook



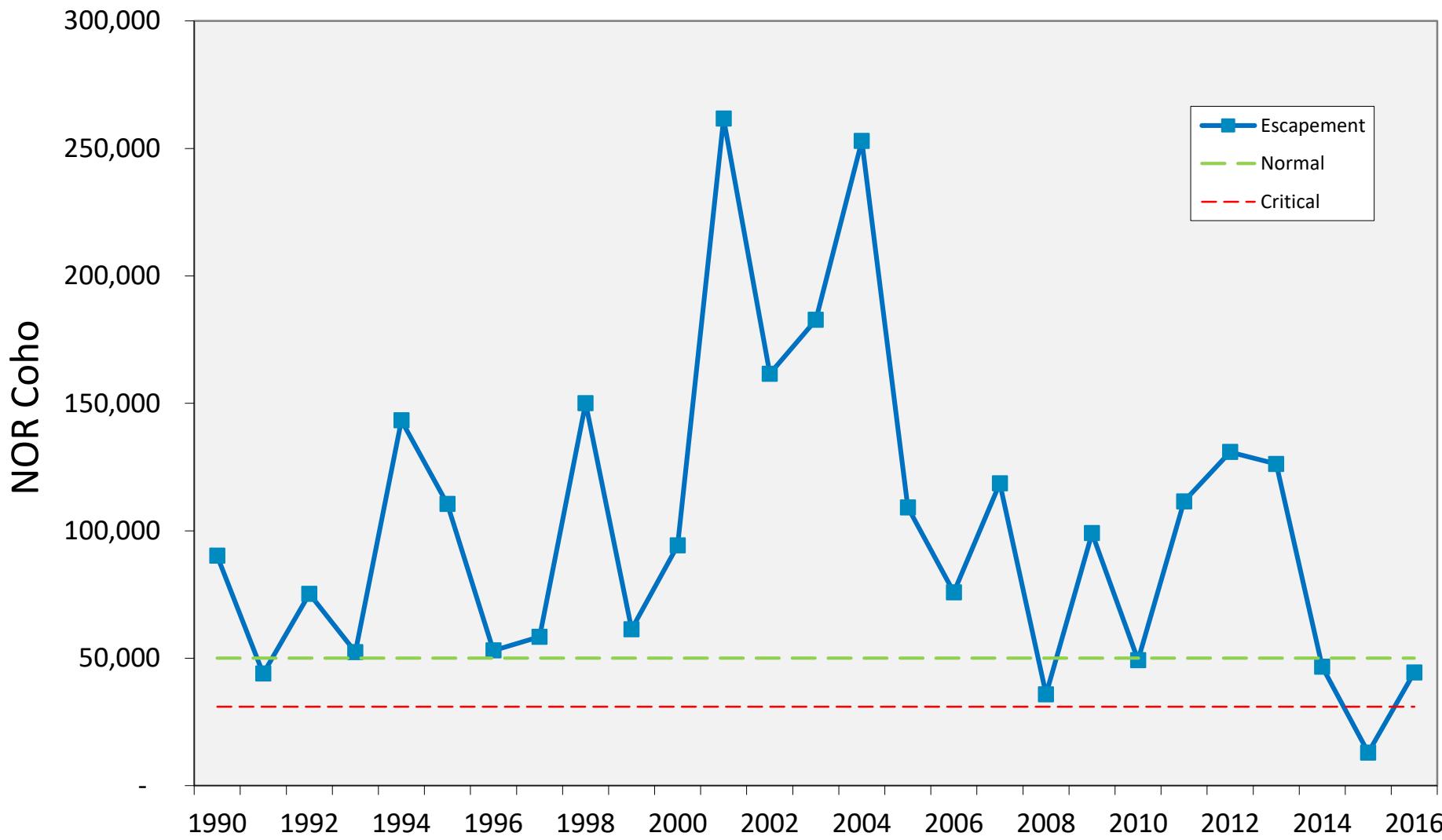
Skykomish Chinook



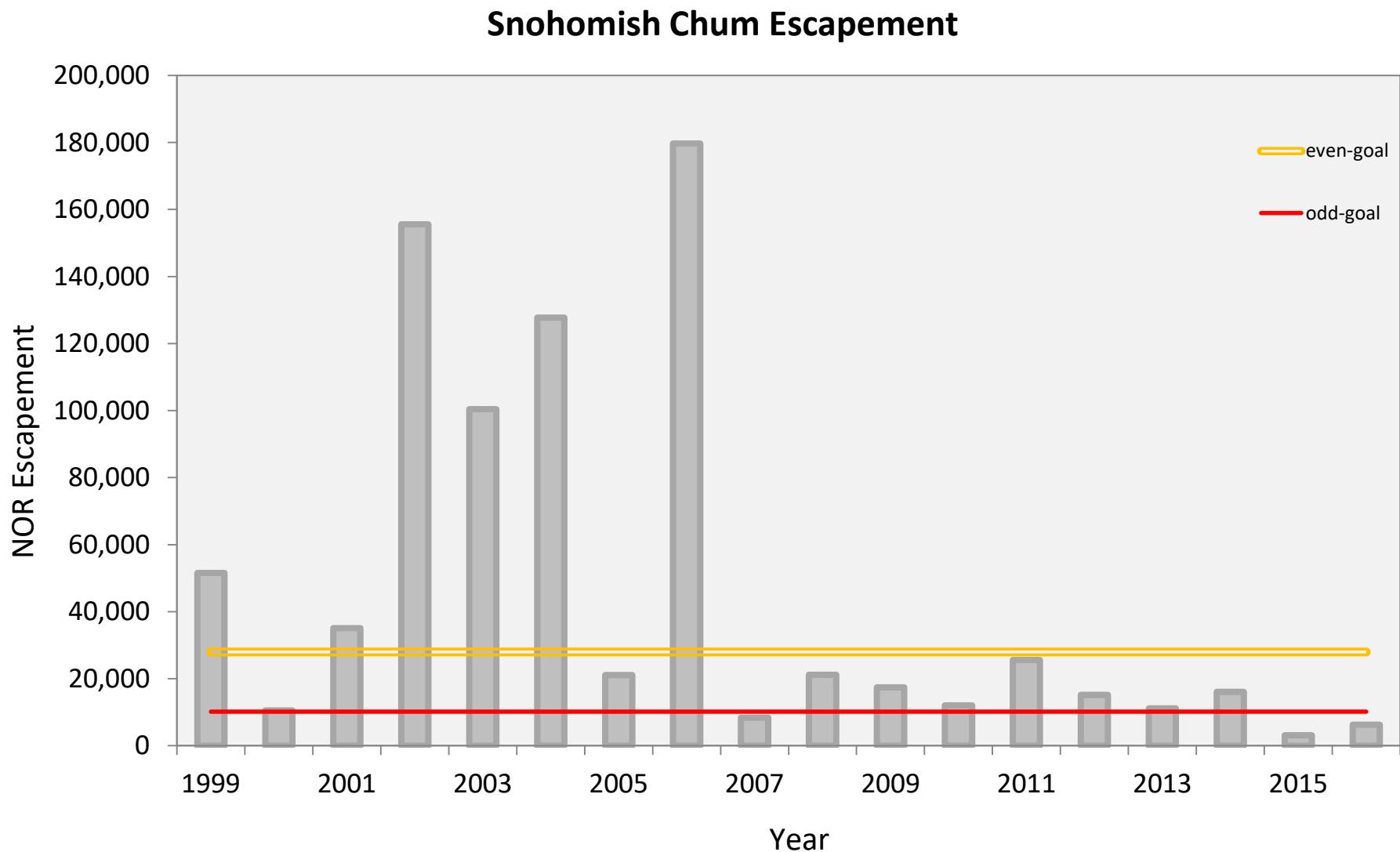
Snohomish Coho Escapement (50 yr record)



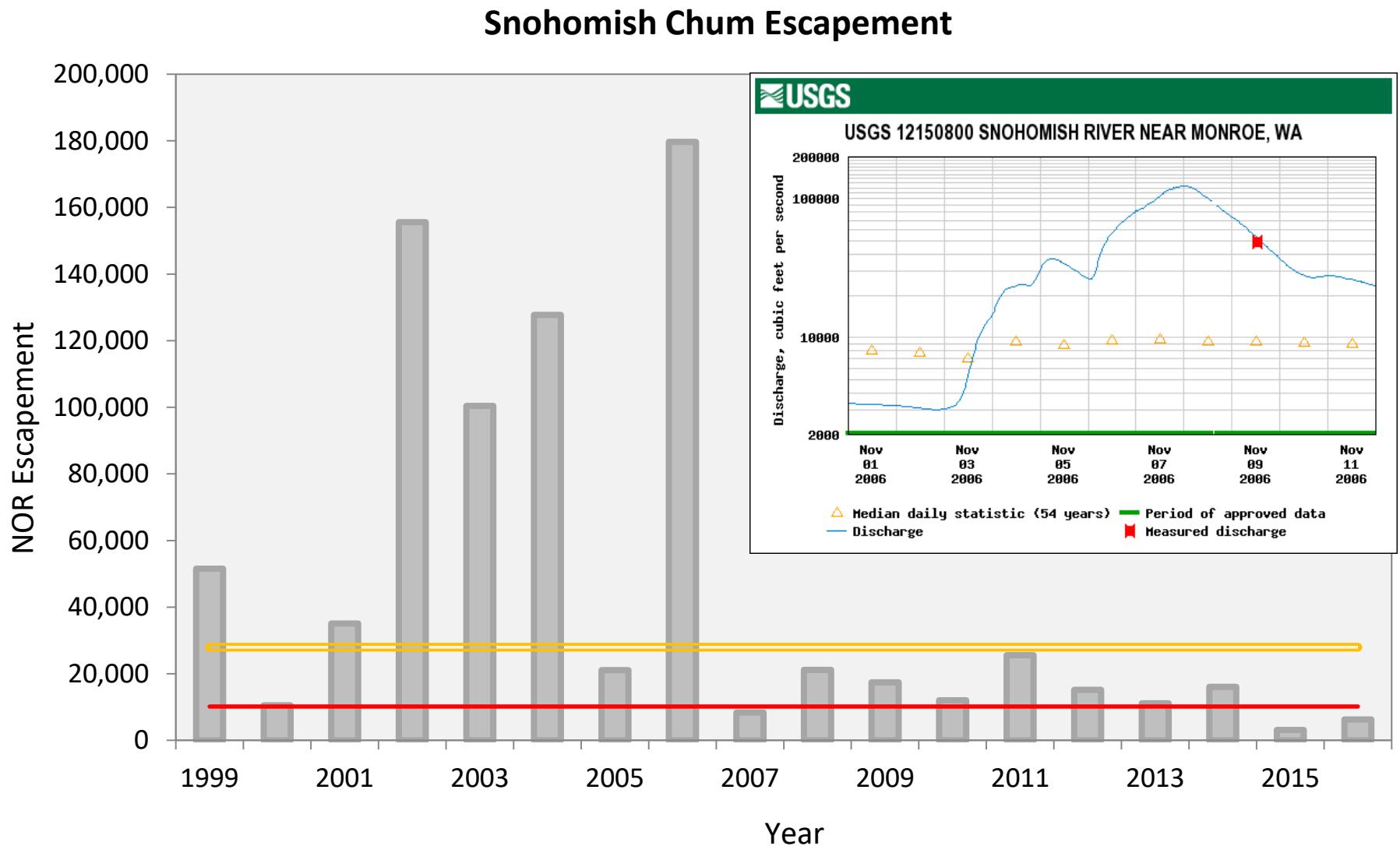
Snohomish Coho Escapement (26 yr record)



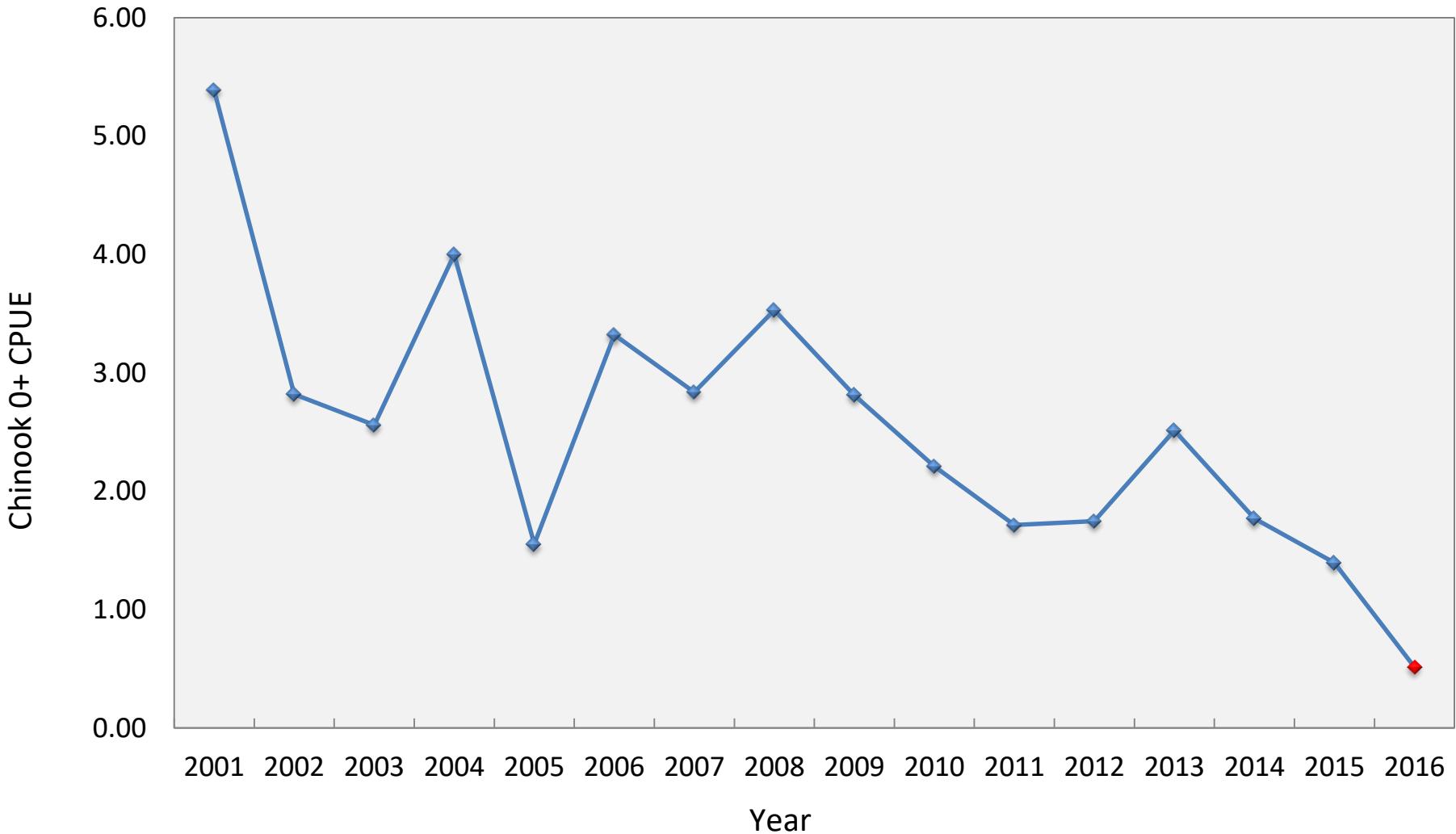
Snohomish Chum Escapement



Snohomish Chum Escapement

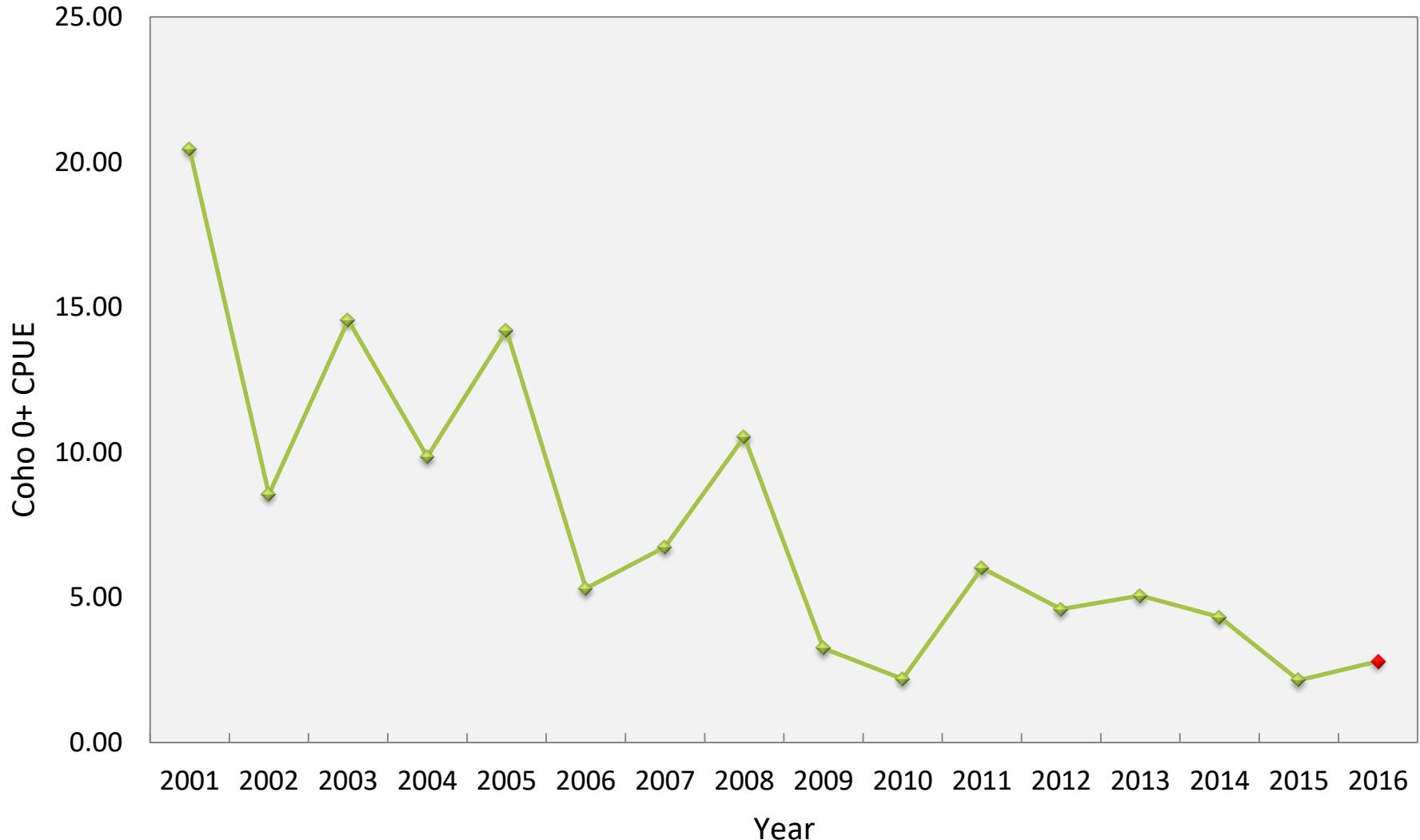


Screw Trap: Catch per unit effort (CPUE)-Chinook

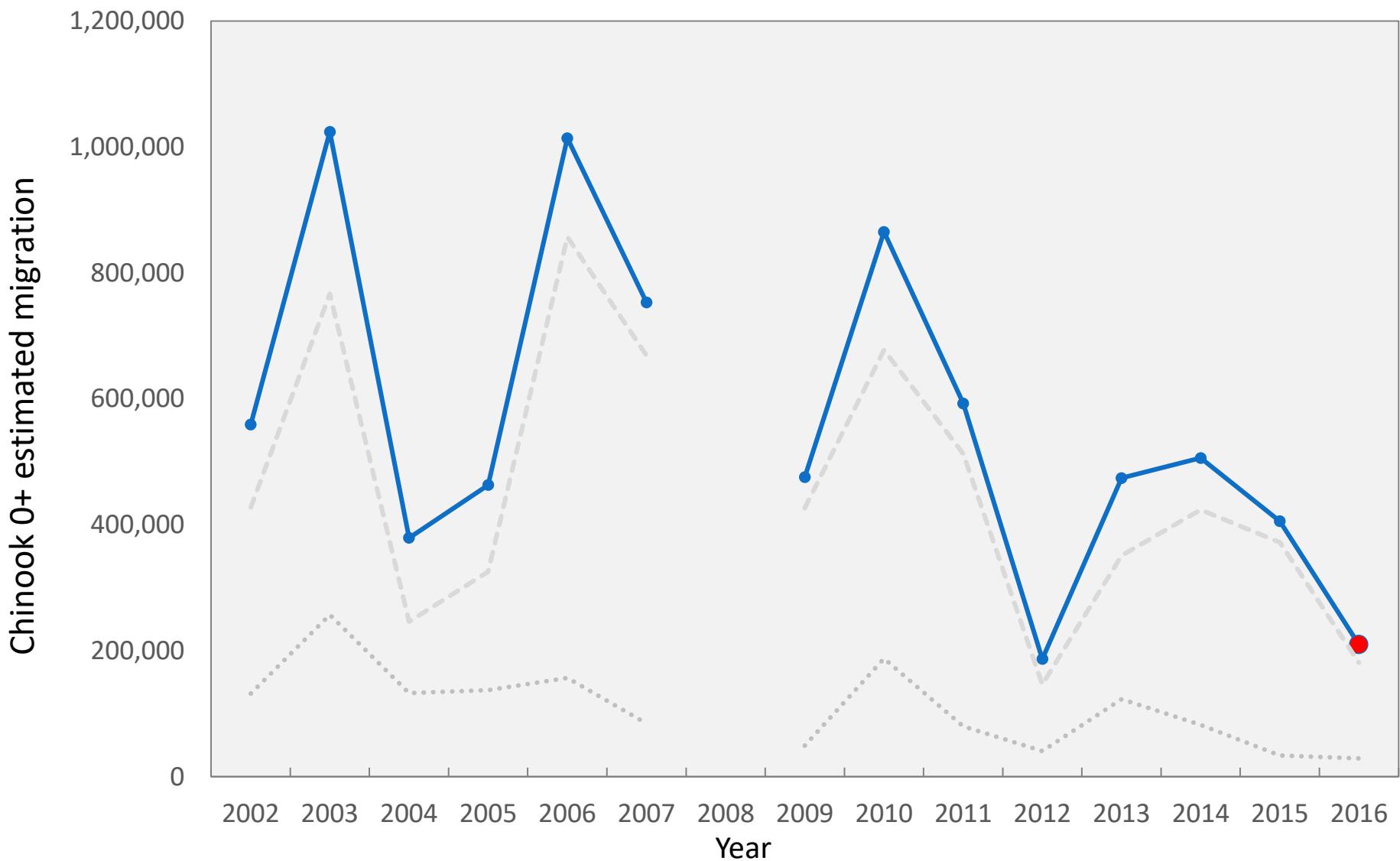


Screw Trap: Catch per unit effort (CPUE)

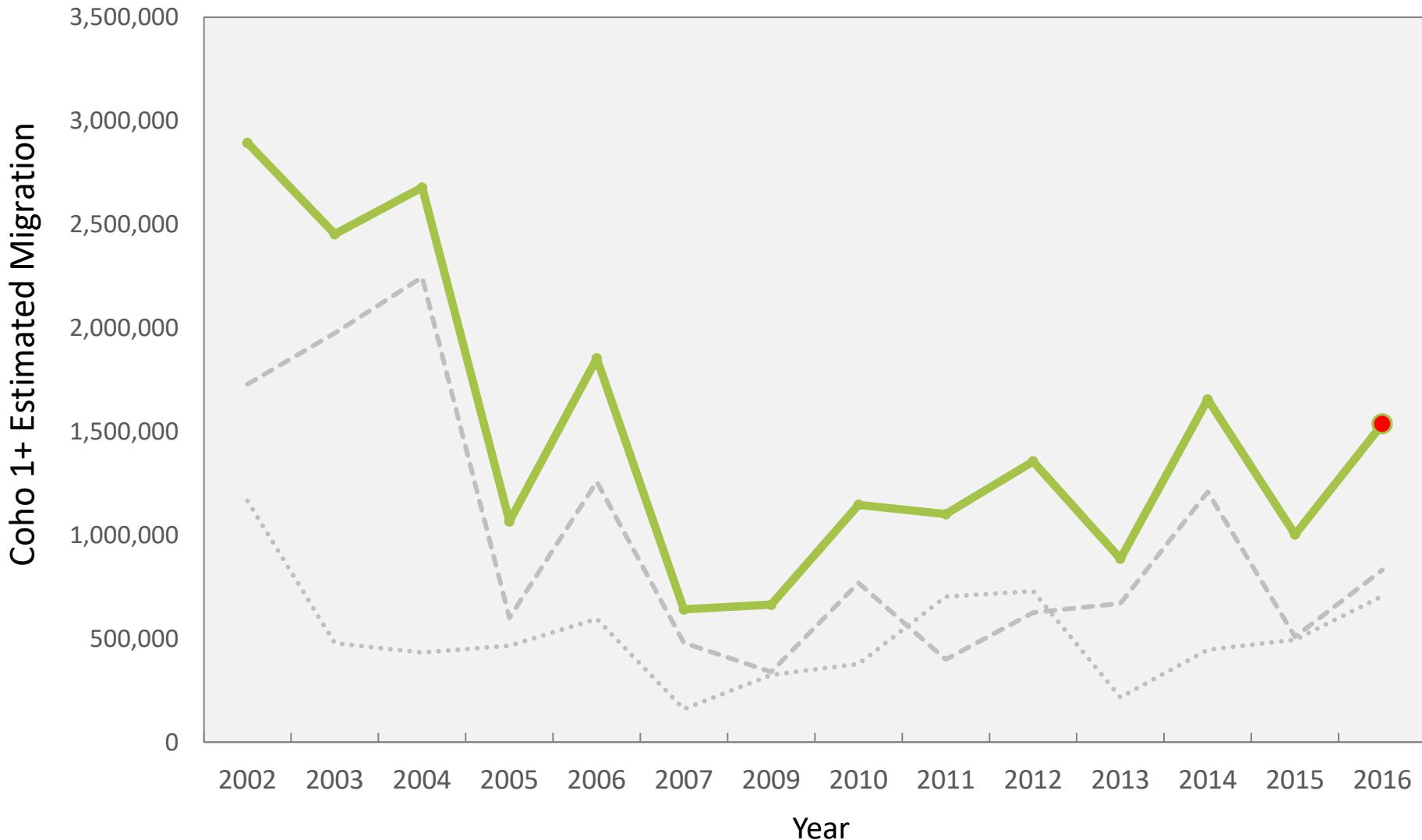
- Coho



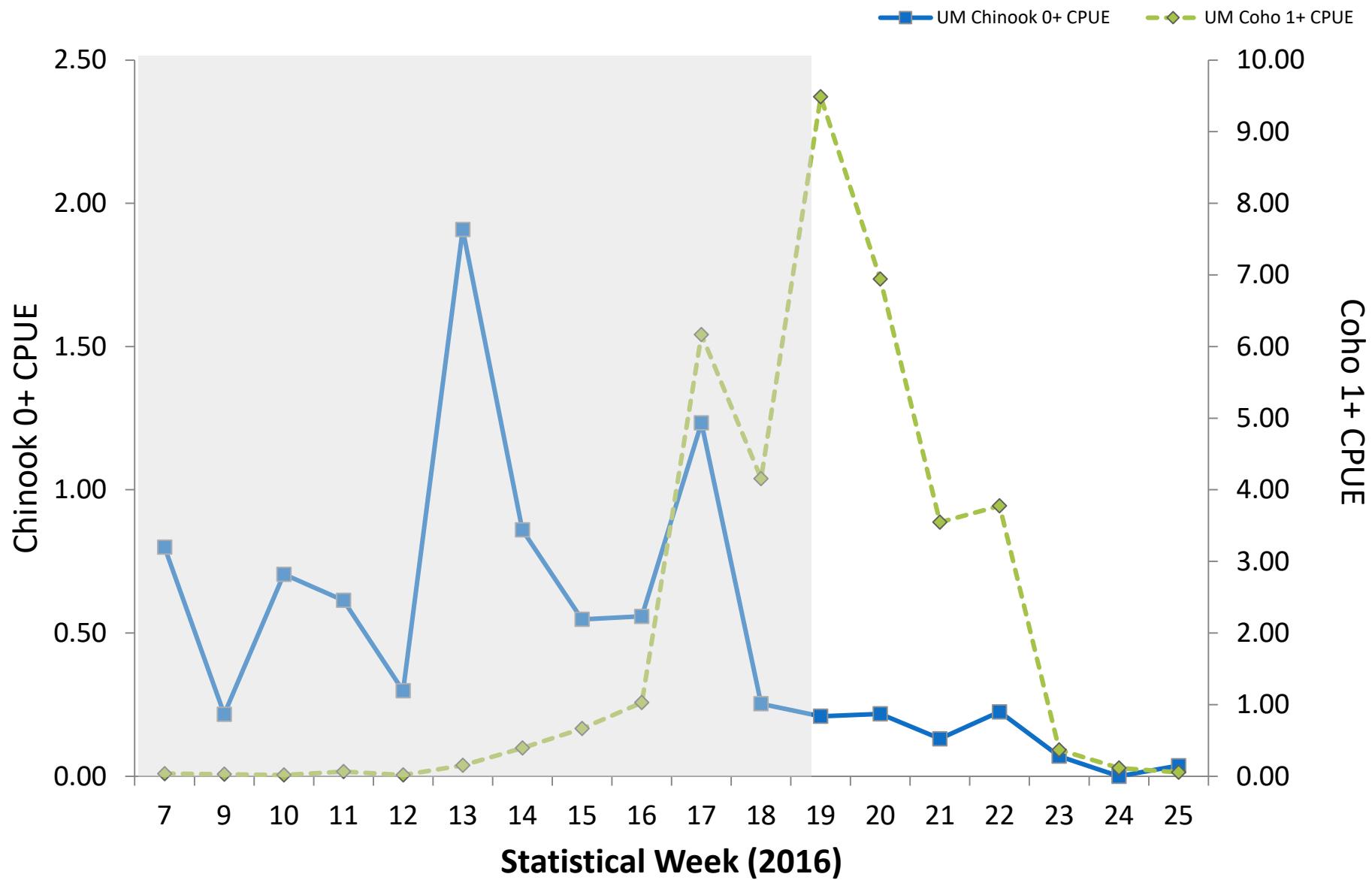
Screw Trap: 2016 Chinook 0+ migration



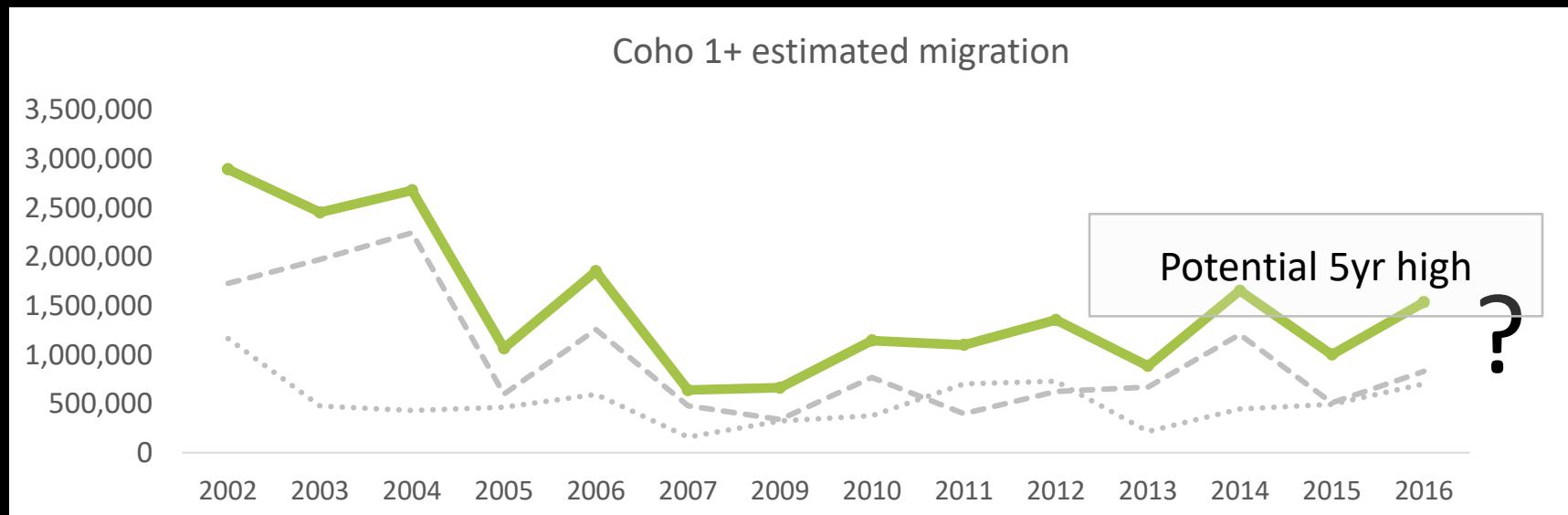
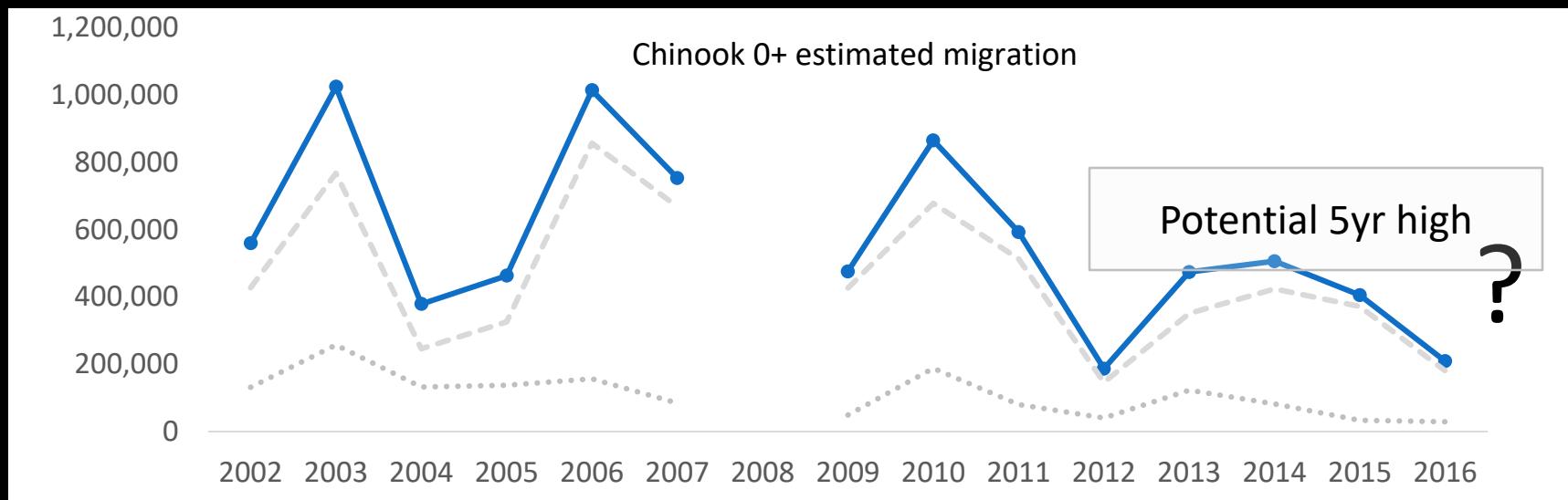
Screw Trap: 2016 Coho 1+ Estimate



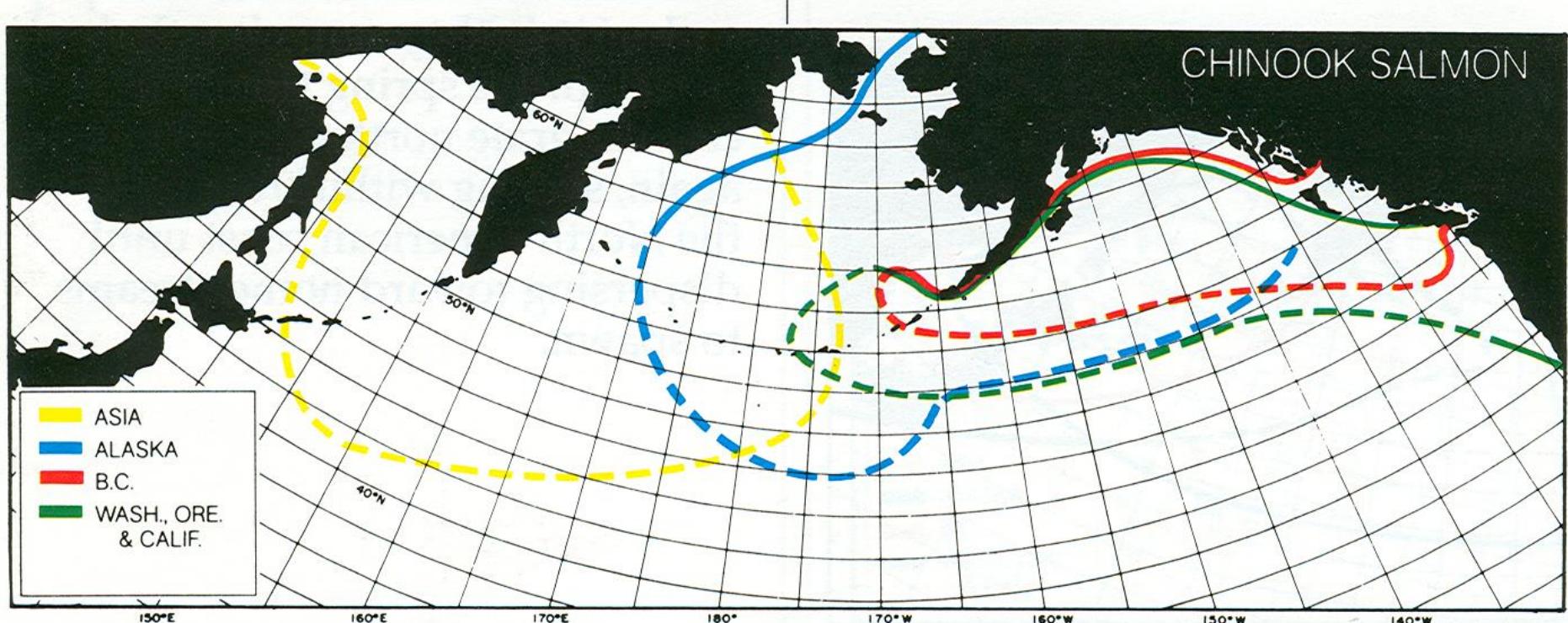
Screw Trap: Migration distribution



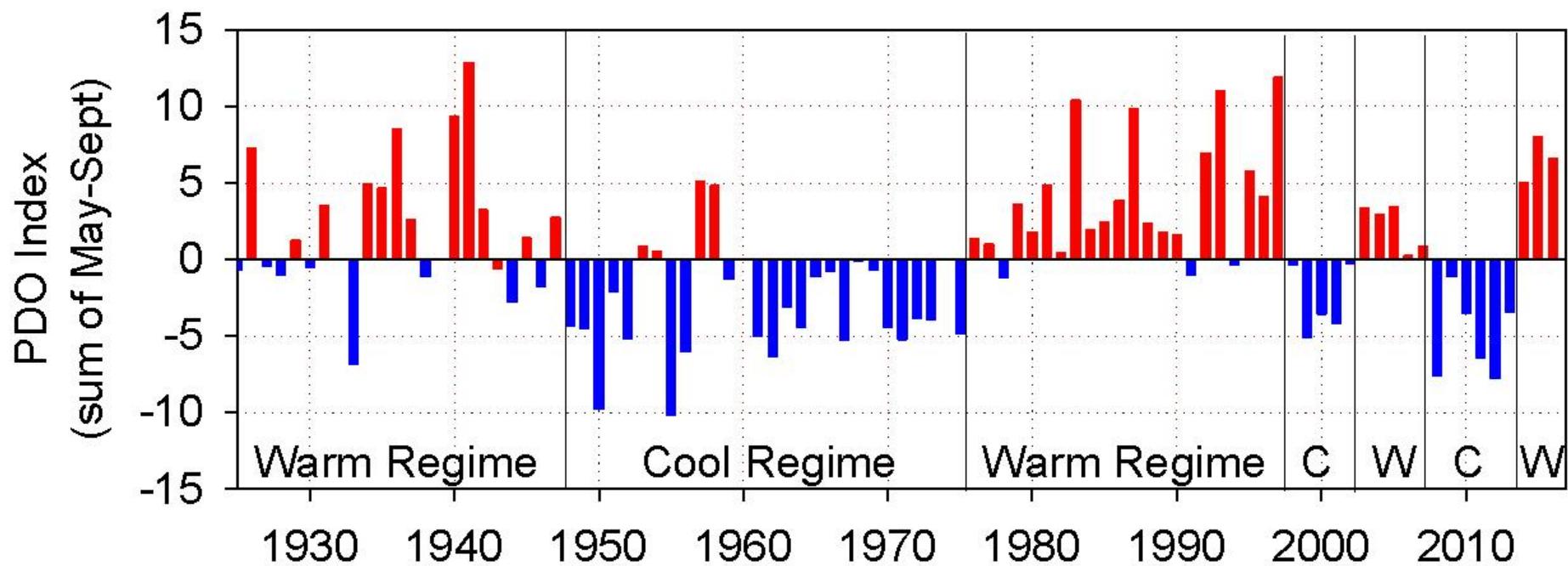
2017 Anecdotes = GOOD!



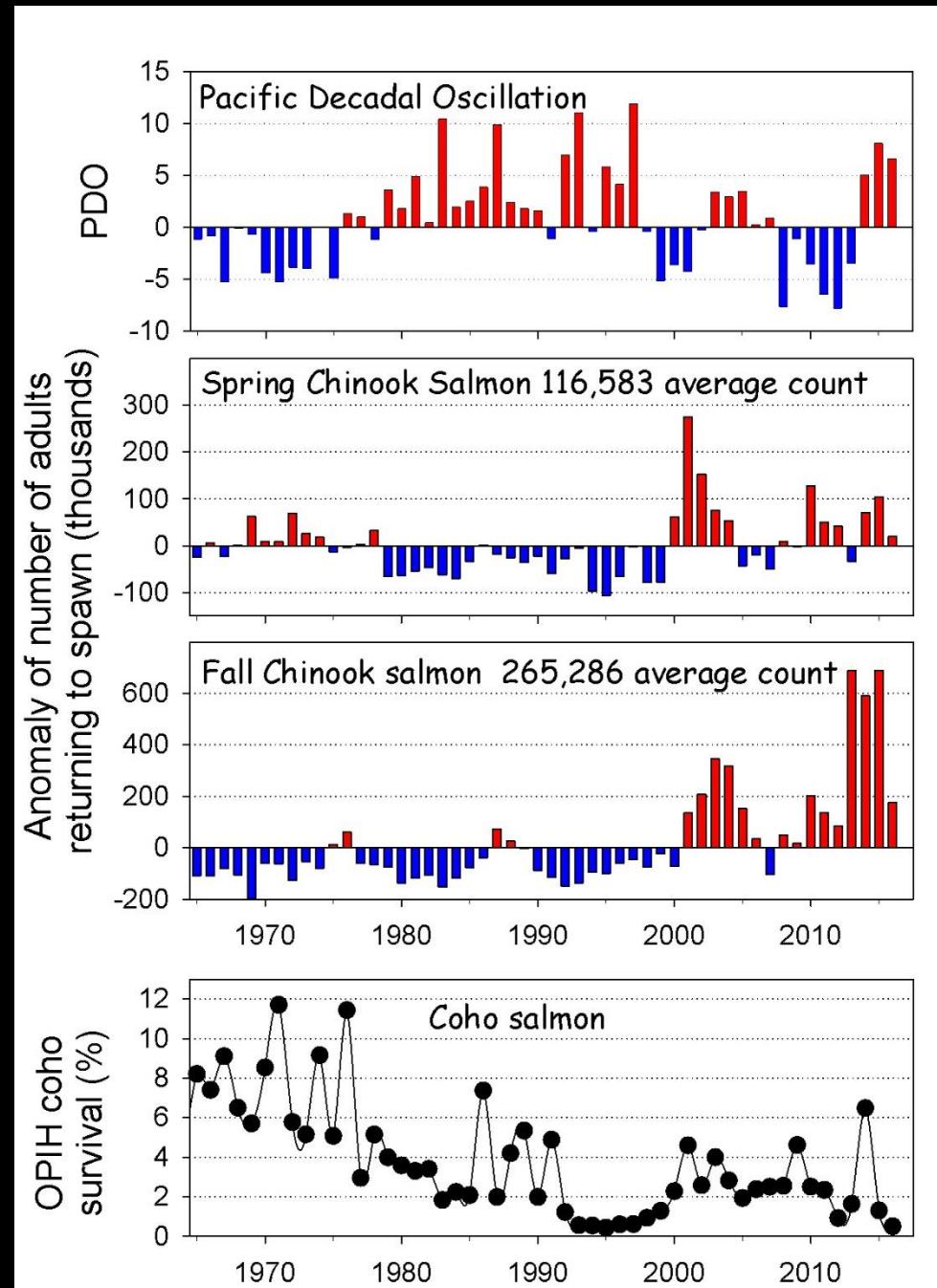
PS Chinook Salmon are Widely Distributed in the Pacific Ocean



Ocean Conditions - PDO



Ocean Conditions - PDO Correlations with marine survival



<https://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ca-pdo.cfm>

2015-2016 Ocean indicators - bad

	Year																			
Ecosystem Indicators	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
PDO (Sum Dec-March)	16	6	3	12	7	18	11	15	13	9	5	1	14	4	2	8	10	19	17	
PDO (Sum May-Sept)	10	4	6	5	11	15	14	16	12	13	2	9	7	3	1	8	17	19	18	
ONI (Average Jan-June)	18	1	1	6	12	14	13	15	8	11	3	10	16	4	5	7	9	17	19	
46050 SST (°C; May-Sept)	15	8	3	4	1	7	19	14	5	16	2	9	6	10	11	12	13	18	17	
Upper 20 m T (°C; Nov-Mar)	18	11	8	10	6	14	15	12	13	5	1	9	16	4	3	7	2	19	17	
Upper 20 m T (°C; May-Sept)	15	11	13	4	1	3	19	17	7	8	2	5	12	10	6	16	18	9	14	
Deep temperature (°C; May-Sept)	19	6	8	4	1	10	12	16	11	5	2	7	14	9	3	15	18	17	13	
Deep salinity (May-Sept)	18	3	8	4	5	15	16	9	6	1	2	13	17	12	11	10	19	14	7	
Copepod richness anom. (no. species; May-Sept)	17	2	1	7	6	13	12	16	14	10	8	9	15	4	5	3	11	18	19	
N. copepod biomass anom. (mg C m⁻³; May-Sept)	17	13	9	10	3	15	12	18	14	11	6	8	7	1	2	4	5	16	19	
S. copepod biomass anom. (mg C m⁻³; May-Sept)	19	2	5	4	3	13	14	18	12	10	1	7	15	9	8	6	11	16	17	
Biological transition (day of year)	17	11	6	7	8	12	10	16	15	3	1	2	14	4	9	5	13	19	19	
Ichthyoplankton biomass (log(mg C 1000 m⁻³); Jan-Mar)	19	10	2	6	8	17	16	12	15	14	1	11	3	13	9	7	18	4	5	
Ichthyoplankton community index (PCO axis 1 scores; Jan-Mar)	9	13	1	6	4	10	18	16	3	12	2	14	15	11	5	7	8	17	19	
Chinook salmon juvenile catches (no. km⁻¹; June)	18	4	5	16	10	13	17	19	12	8	1	6	7	15	3	2	9	14	11	
Coho salmon juvenile catches (no. km⁻¹; June)	18	7	12	5	6	2	15	19	16	3	4	9	10	14	17	1	11	8	13	
Mean of ranks	16.4	7.0	5.7	6.9	5.8	11.9	14.6	15.5	11.0	8.7	2.7	8.1	11.8	7.9	6.3	7.4	12.0	15.3	15.3	
Rank of the mean rank	19	6	2	5	3	13	15	18	11	10	1	9	12	8	4	7	14	16	16	

Ecosystem Indicators not included in the mean of ranks or statistical analyses

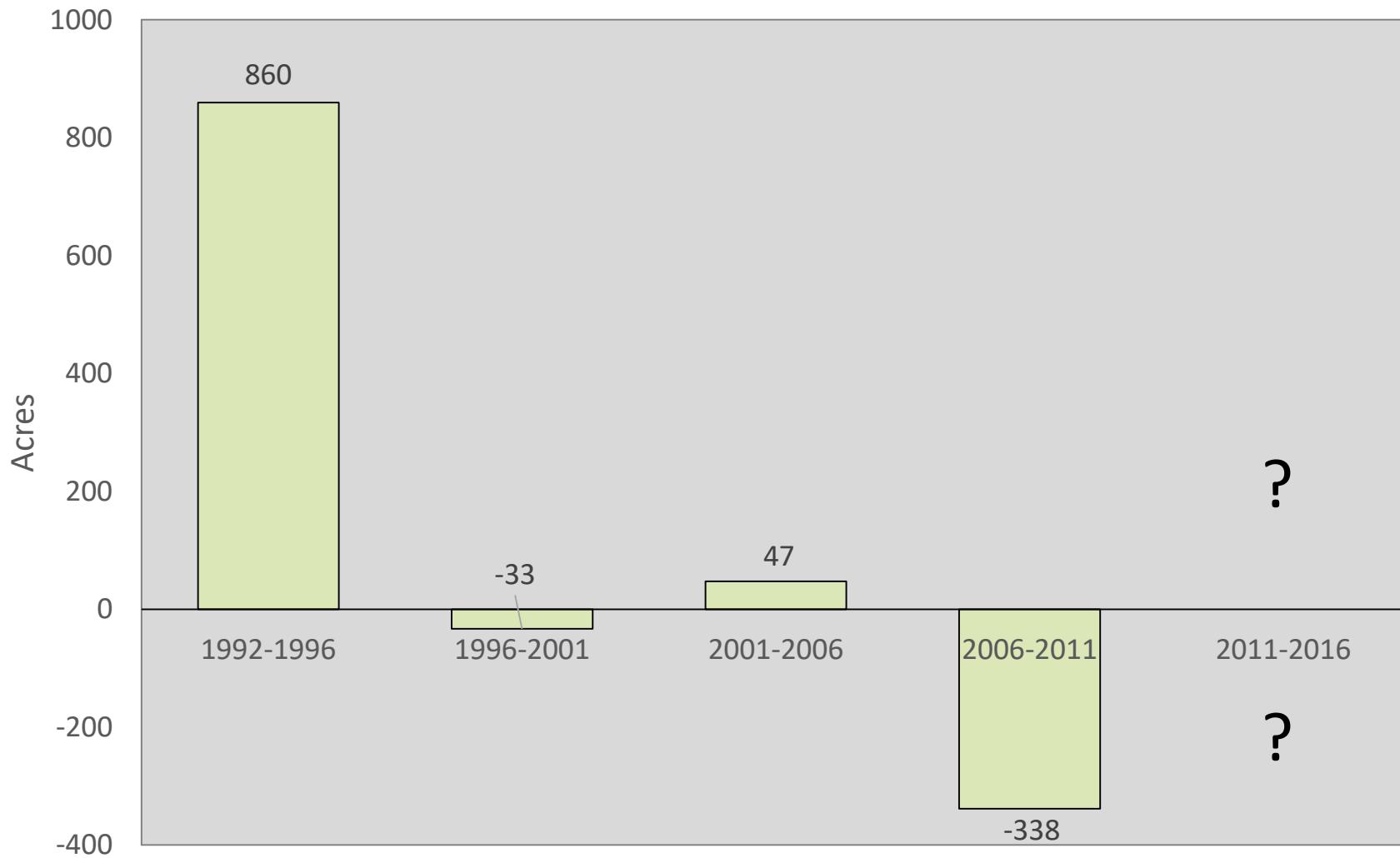
Physical Spring Trans. UI based (day of year)	3	7	18	15	4	12	14	19	12	1	6	2	8	11	16	9	17	10	5
Physical Spring Trans. Hydrographic (day of year)	18	3	13	8	5	12	14	19	6	9	1	9	17	3	11	2	15	7	16
Upwelling Anomaly (April-May)	9	3	16	5	8	13	12	19	9	4	6	7	14	16	14	11	18	1	2
Length of Upwelling Season UI based (days)	6	2	17	11	1	12	9	19	5	3	8	3	14	16	14	13	18	10	7
SST NH-5 (°C; May-Sept)	8	6	5	4	1	3	19	15	9	17	2	18	10	7	13	12	14	11	16
Copepod Community Index (MDS axis 1 scores)	18	5	4	8	1	13	14	16	15	10	2	6	12	9	7	3	11	17	19
Coho Juv Catches (no. fish km⁻¹; Sept)	11	2	1	4	3	6	12	14	8	9	7	15	13	5	10	NA	NA	NA	NA

2017 Outlook for Coho and Chinook

	Juvenile Migration Year				Adult Return Outlook	
	2013	2014	2015	2016	coho 2017	Chinook 2017
Large-scale ocean and atmospheric indicators						
<u>PDO (May - Sept)</u>	■	■	■	■	●	●
<u>ONI (Jan - Jun)</u>	■	■	■	■	●	●
Local and regional physical indicators						
<u>Sea surface temperature</u>	■	■	■	■	●	●
<u>Deep water temperature</u>	■	■	■	■	●	●
<u>Deep water salinity</u>	■	■	■	■	●	●
Local biological indicators						
<u>Copepod biodiversity</u>	■	■	■	■	●	●
<u>Northern copepod anomalies</u>	■	■	■	■	●	●
<u>Biological spring transition</u>	■	■	■	■	●	●
<u>Winter ichthyoplankton biomass</u>	■	■	■	■	●	●
<u>Winter ichthyoplankton community</u>	■	■	■	■	●	●
<u>Juvenile Chinook salmon catch – June</u>	■	■	■	■	●	●
<u>Juvenile coho salmon catch – June</u>	■	■	■	■	●	●
Key ■ good conditions for salmon ■ intermediate conditions for salmon ■ poor conditions for salmon				● good returns expected ● intermediate returns expected ● poor returns expected		

Freshwater habitat

Gain/loss in forests and wetlands in fish bearing stream buffers of WRIA 7



2017 Forecast

2015



Few Showers

60°

2016



Mostly Sunny

63°

2017



Partly Cloudy

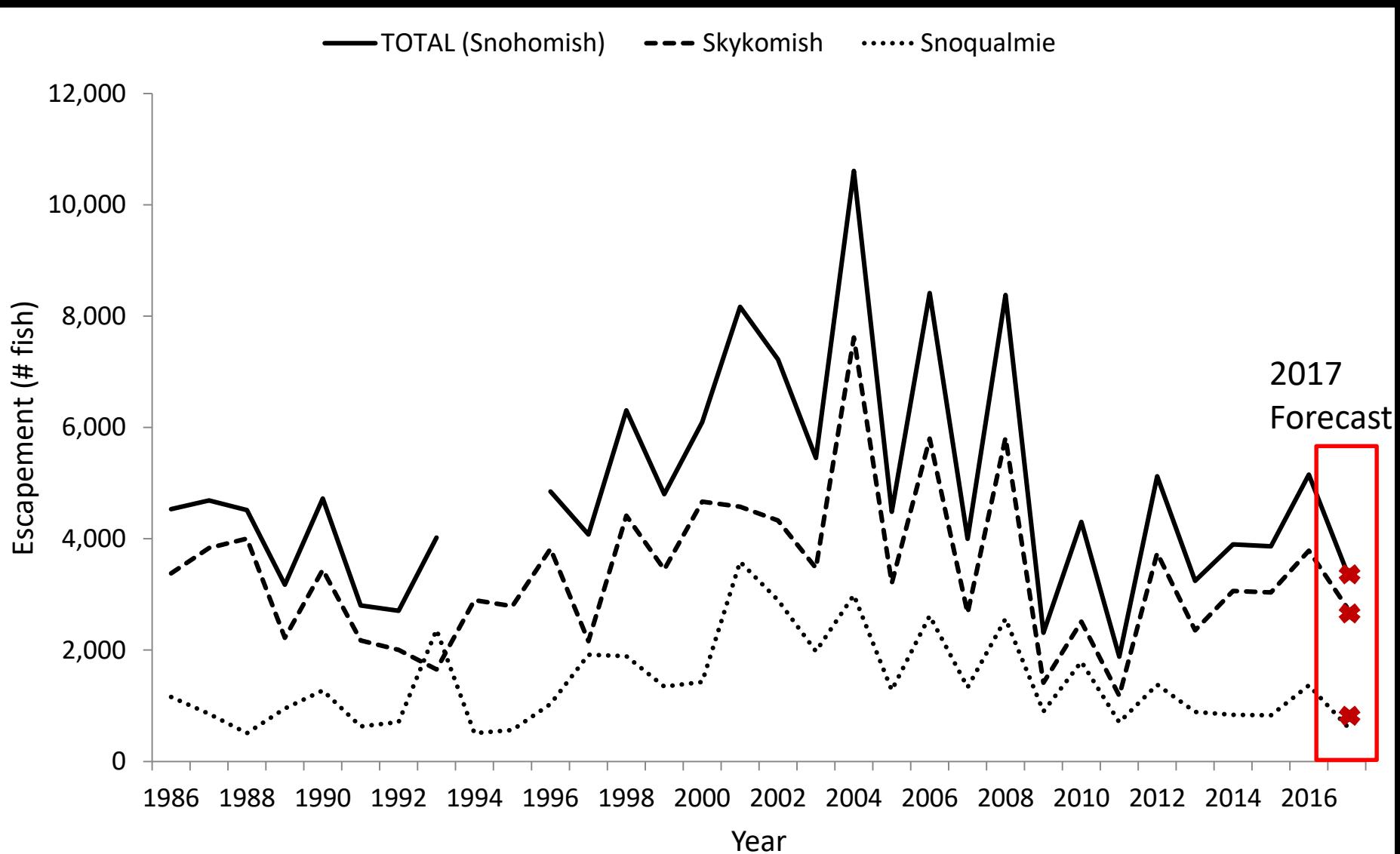
62°

2017 Chinook Forecast

- Snohomish run size
 - 3,600
- Estimated escapement
 - 3,308 (14.3% ER)
 - Skykomish = 2773
 - Snoqualmie = 639
 - LAT = 2800 spawners

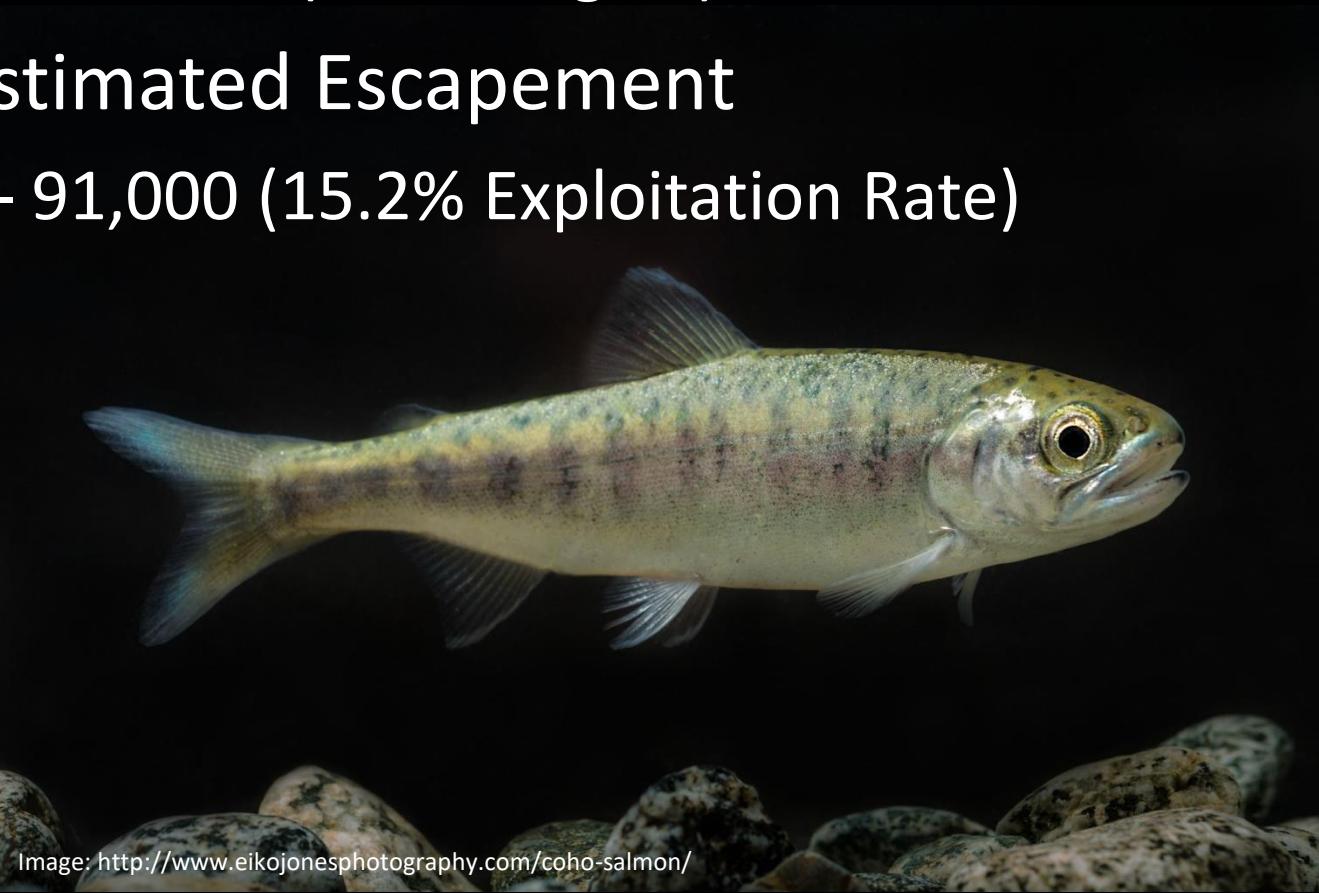


2017 Chinook Forecast



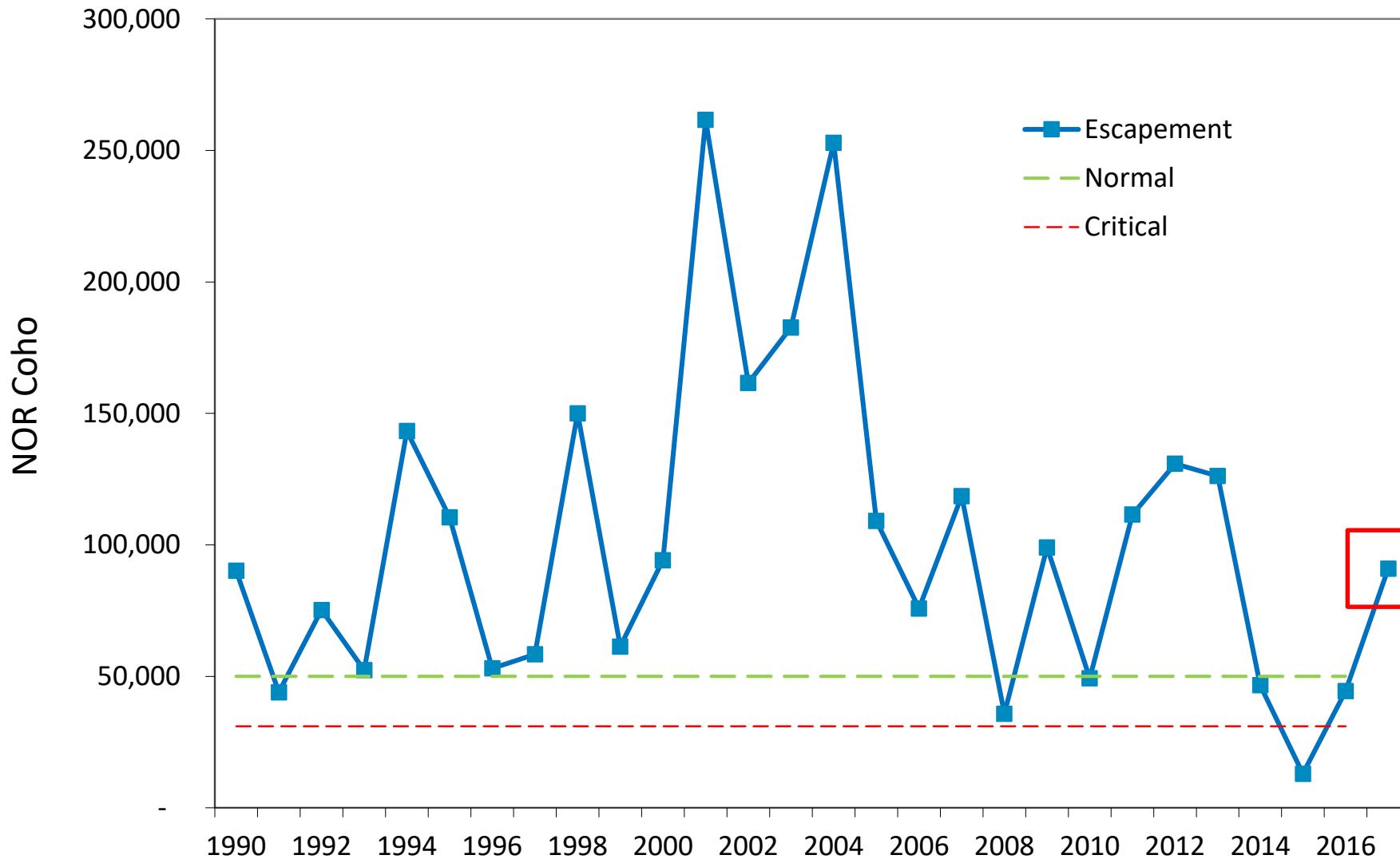
2017 Coho Forecast

- Snohomish Run size
 - 107,325 (Ocean Age 3)
- Estimated Escapement
 - 91,000 (15.2% Exploitation Rate)





2017 Coho Forecast

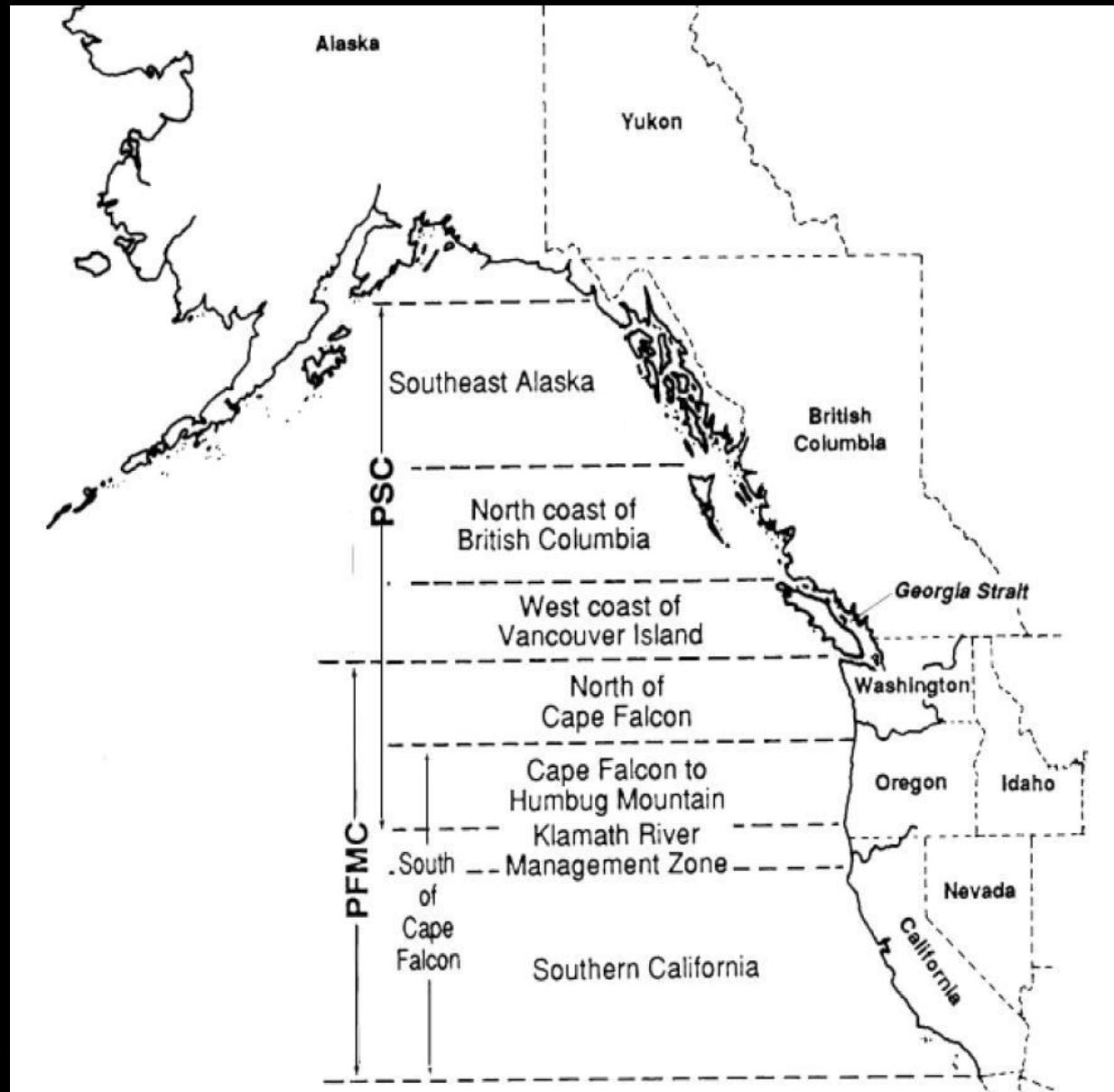


Chum and Pink

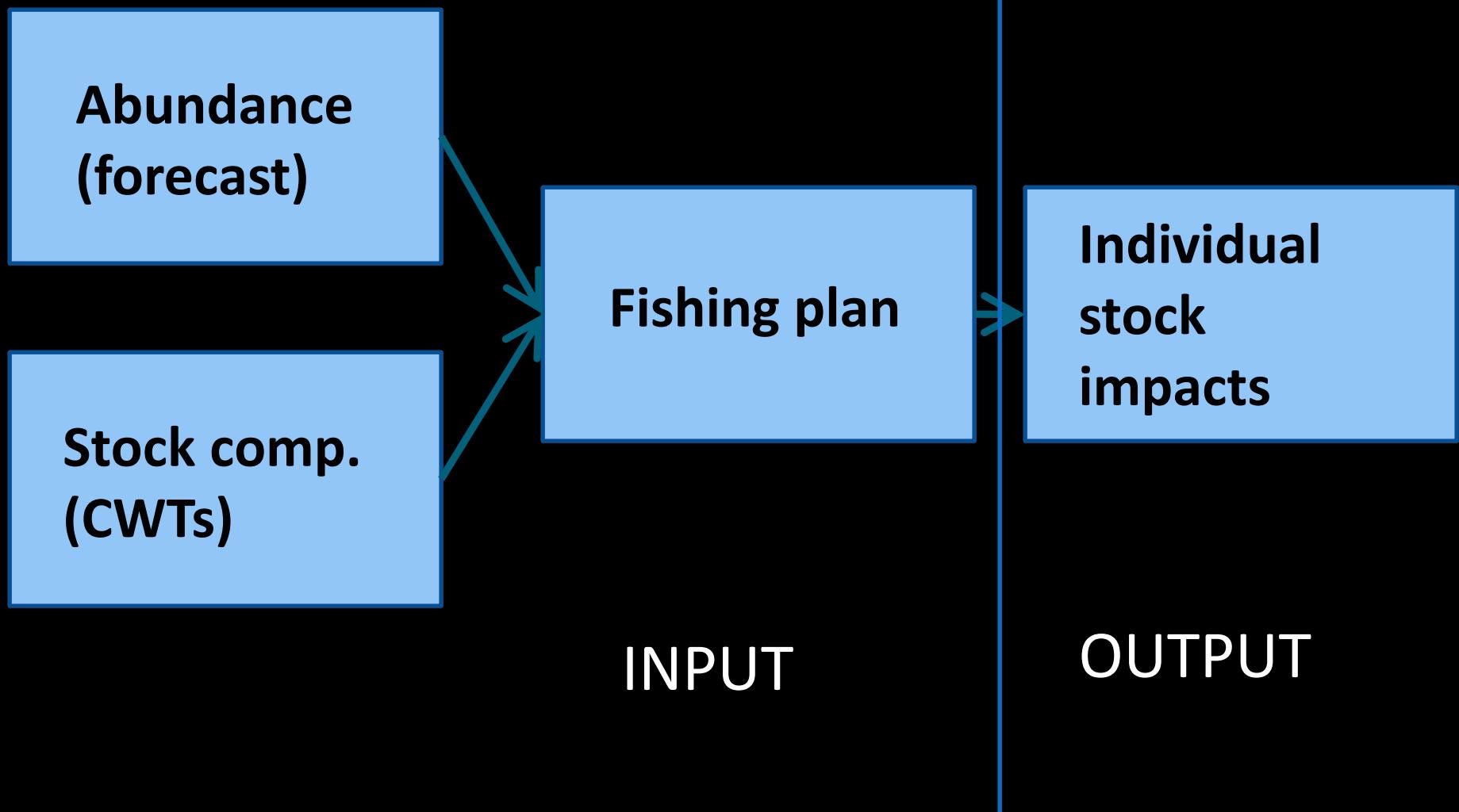
- Chum = 5,280
 - Escapement goal: 10,200
- Pink = 171,632
 - Escapement goal: 120,000



Mixed-Stock fisheries occur coast-wide



Fishery Regulation Assessment Model (FRAM)



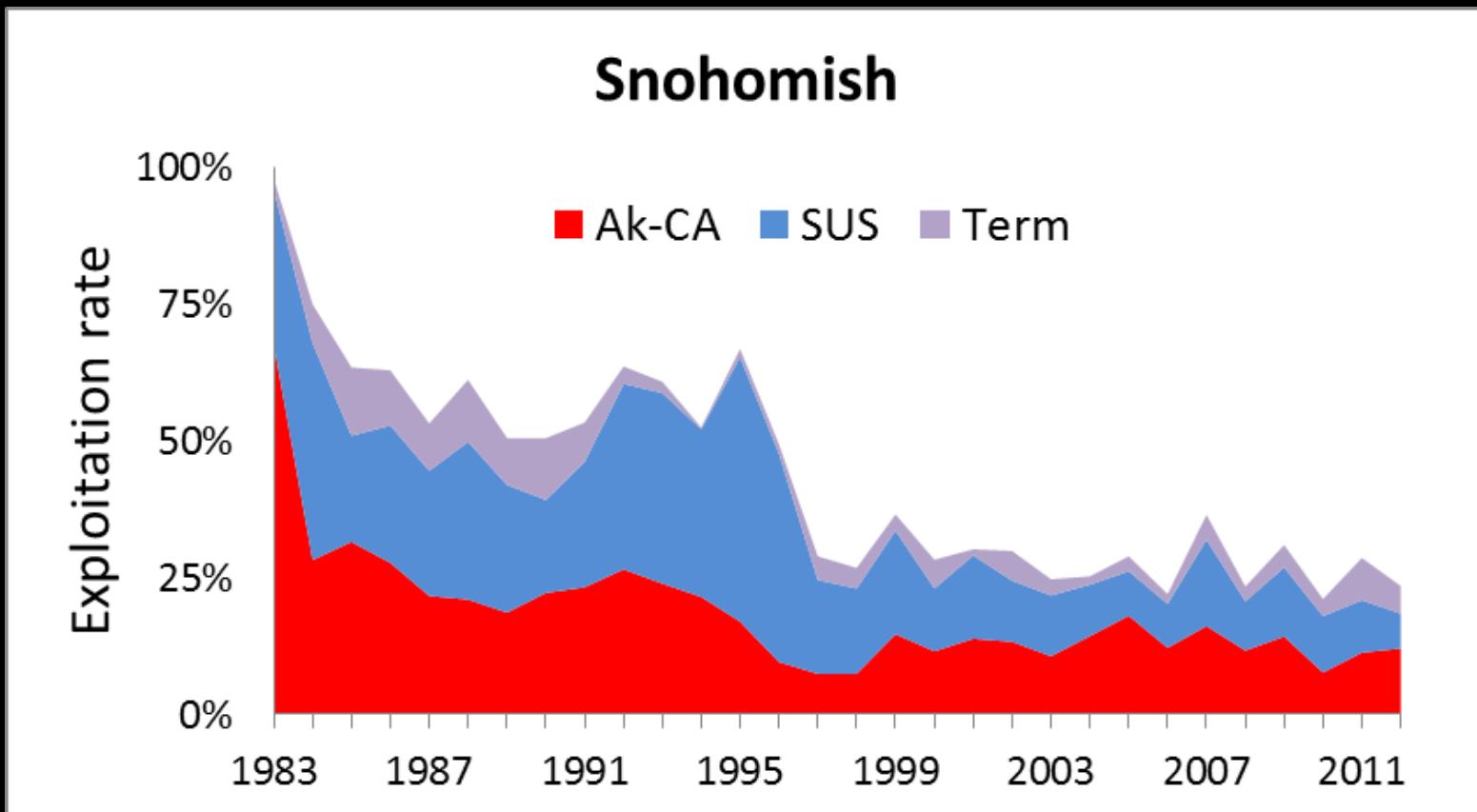
2016 Preseason Planning: FRAM Model

Snohomish natural origin Chinook

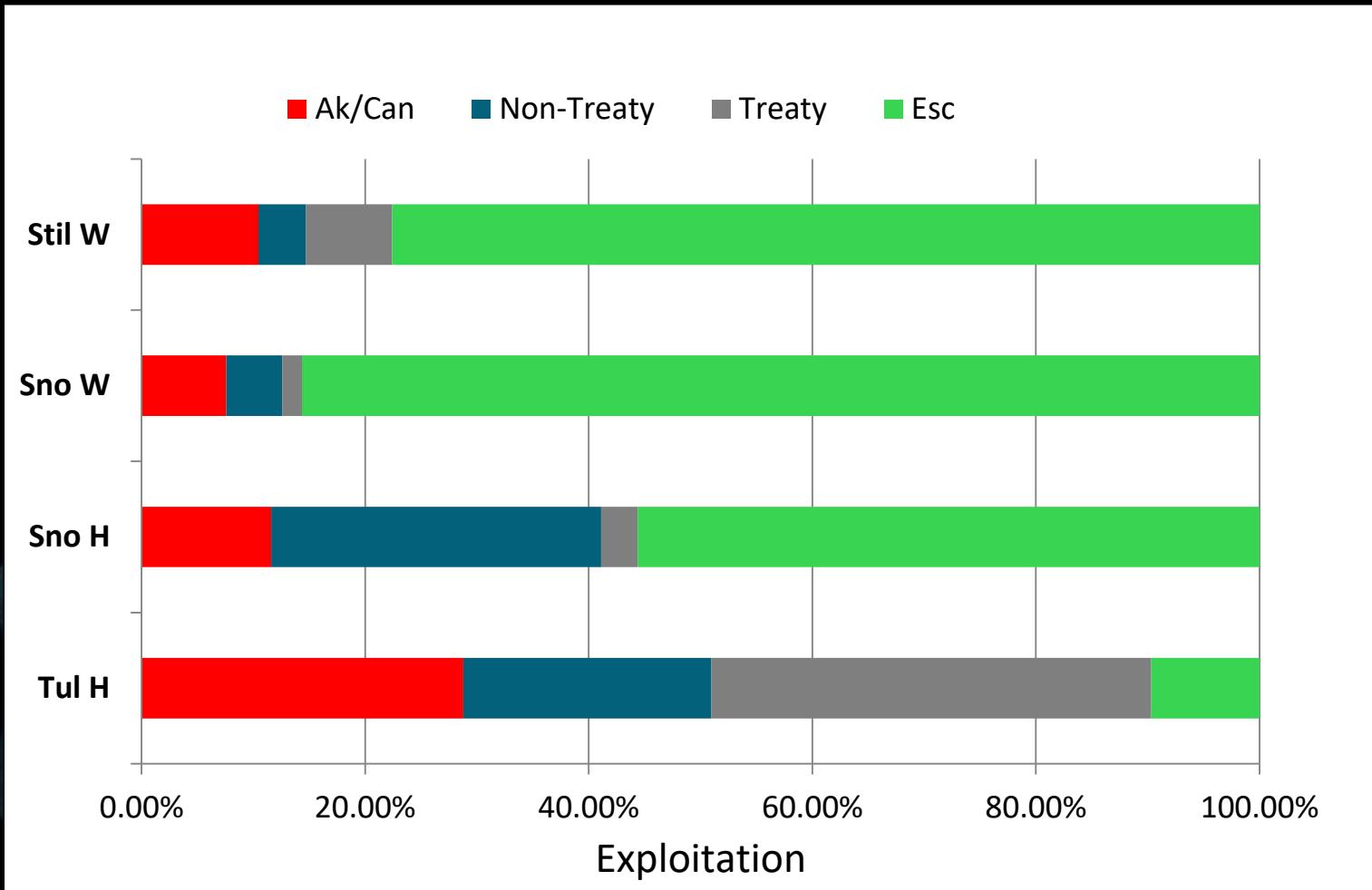
Snohomish unmarked exploitation distribution.

		SUS	
Alaska	11	0.28%	
Canada	281	7.28%	
US NT Ocean	21	0.55%	
PS Sport	129	3.33%	
PS NT Net	6	0.15%	
FW Sport	39	1.00%	5.02% NT
Tr Ocean	23	0.59%	
Tr PS troll	23	0.59%	
PS Tr net	22	0.57%	1.75% Tr
Esc	3,308	85.66%	
Total	3,862	14.34%	6.78%

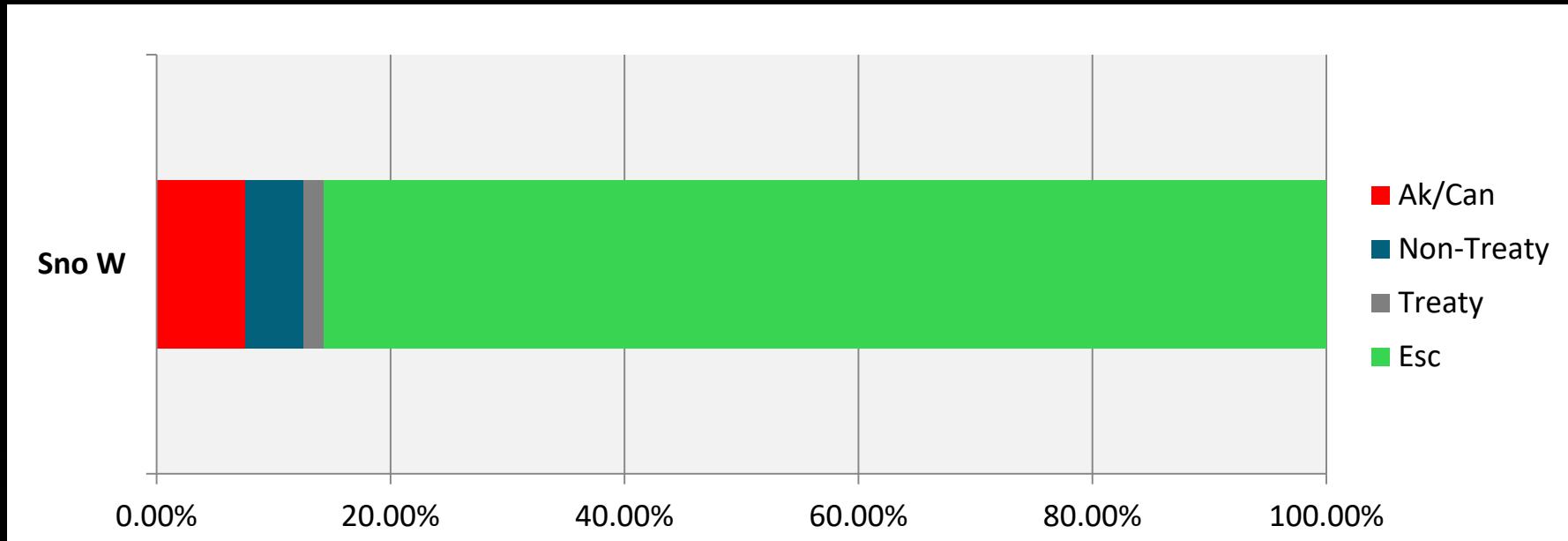
Snohomish Chinook exploitation rate trend



Are we fishing selectively?



Wild Chinook exploitation

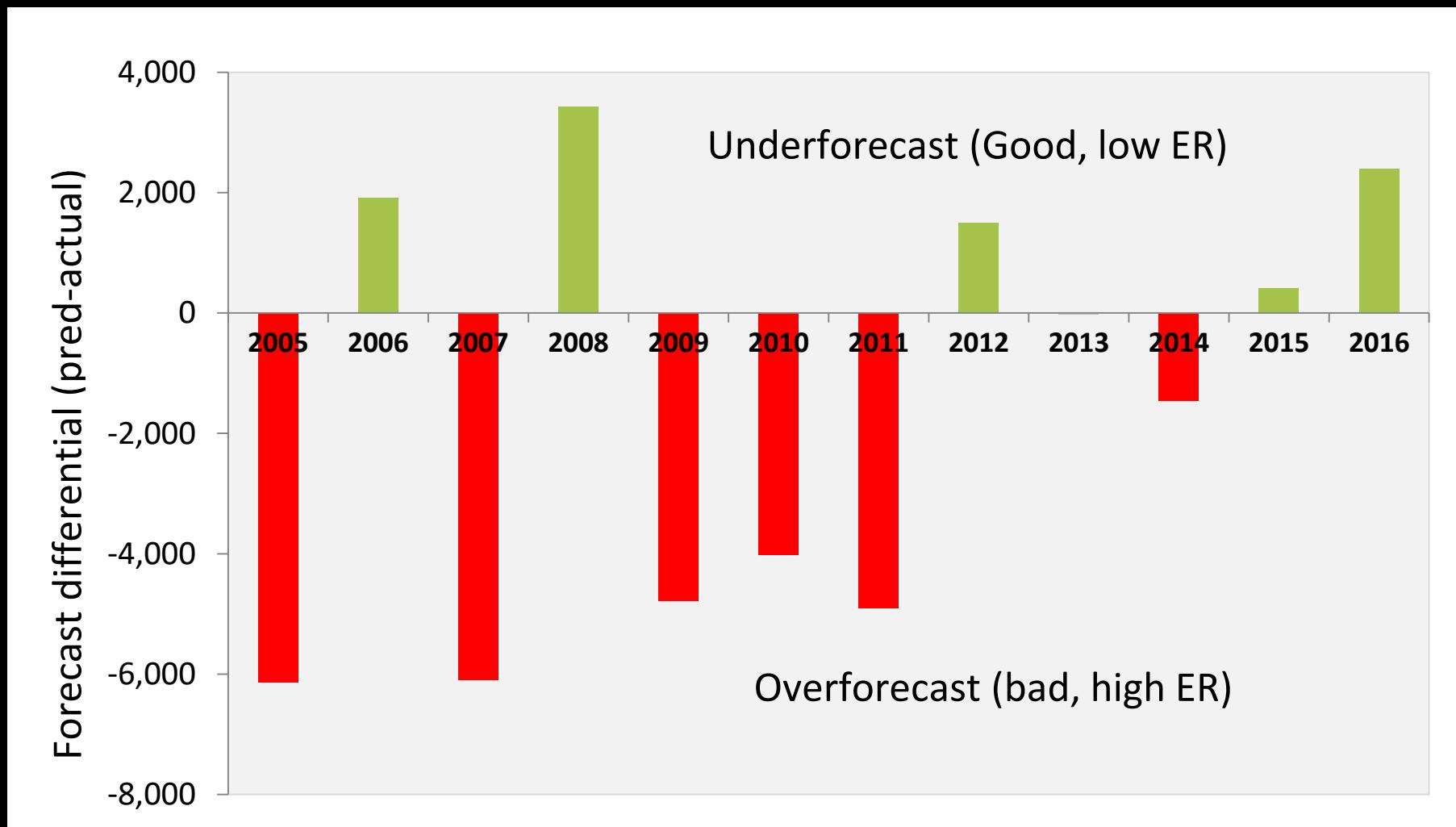


Preseason Forecasting

- Pre-2012 years we have over-forecasted
- For 2012 and beyond, using environmental correlation method with information for all life cycle stages



Chinook Forecast accuracy (Predicted – Actual)

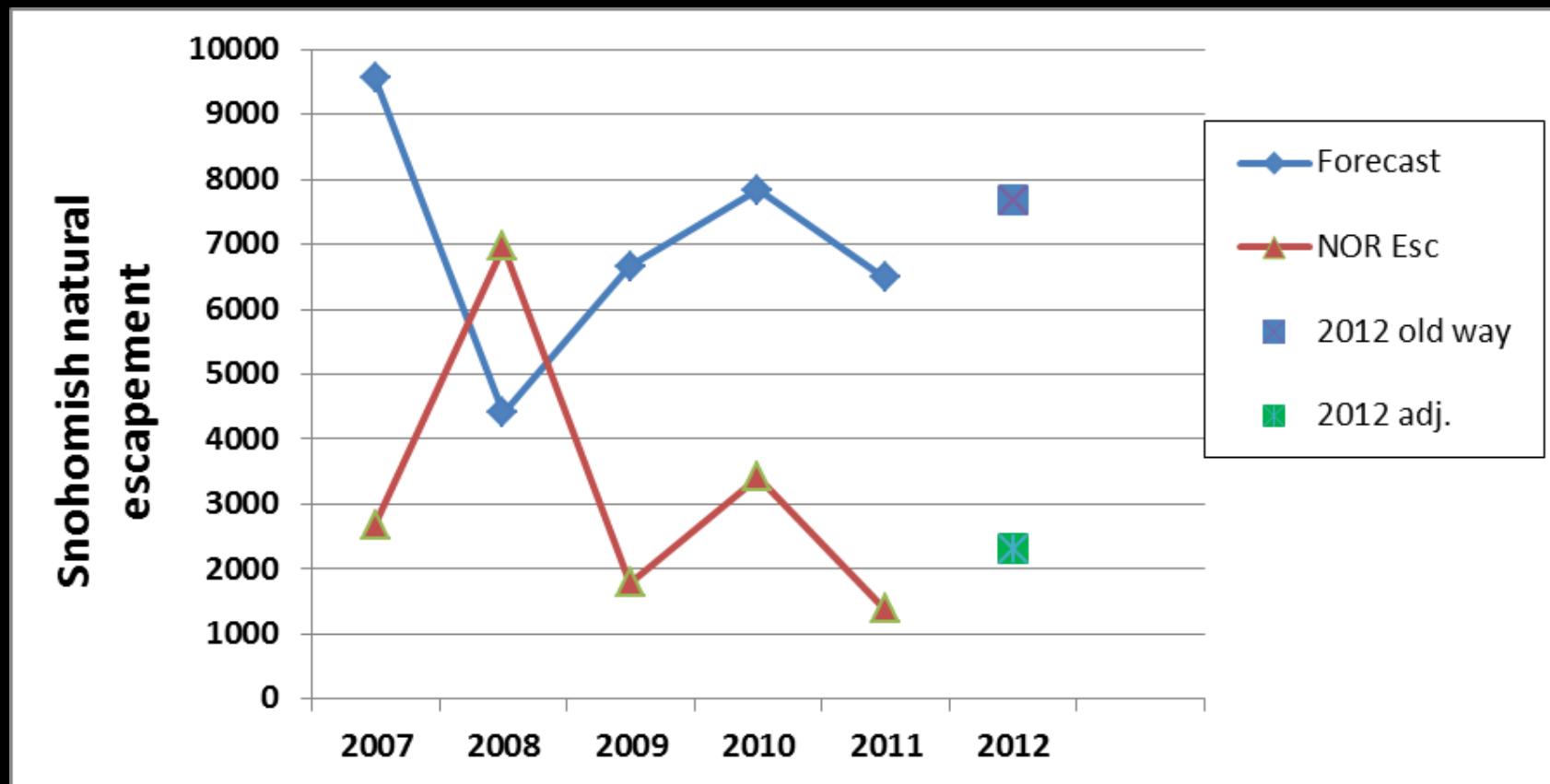


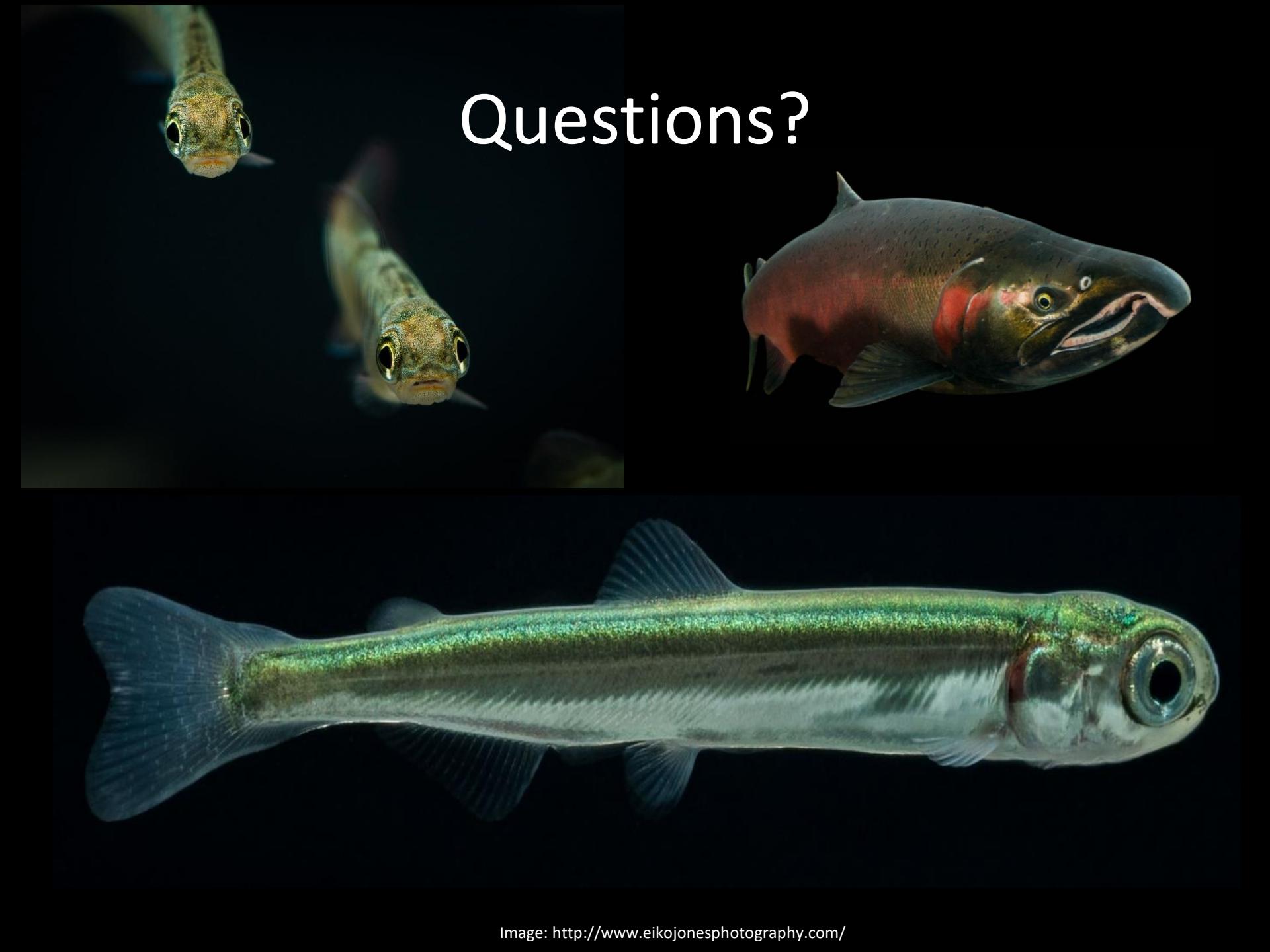
EMPAR Forecast

- Uses escapement, migration, freshwater, marine data
- Principal Components Analysis
- In use since 2012



Natural Run Forecast Adjustment





Questions?